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COMMITTEE ON RECONSTRUCTION

THE IMPORTANCE OF CONSTRUCTION INDUSTRY IN RELATION TO THE CANADIAN ECONOMY

Preliminary Report I

on

The Construction Industry in Relation to Post-War Economic Policy

by

O. J. Firestone, M.A., Ph.D.

Ottawa

November, 1942.

NOT CORRECTED FOR TYPOGRAPHICAL ERRORS

PREFACE

The Committee on Reconstruction asked me to undertake for them a study of the field "The Construction Industry in Relation to Post-War Economic Policy". This field was divided into a number of sections, the first of which is presented herewith under the title "The Importance of Construction Industry in Relation to the Canadian Economy".

In order to give a picture of the structure and scope of the construction industry in Canada as completely as possible, I have not only used material kindly put at my disposal by the various government departments but I have also made a survey of views on problems relating to building and construction held by contractors, architects, editors of construction and building publications, producers of construction material and appliances, members of the Canadian Construction Association, the National Construction Council of Canada, and the Trades and Labour Congress. Much useful information was also put at my disposal by several government departments and research agencies in the United States.

I have further put some of the more important points contained in this preliminary report before a few economists and other persons interested in the field of construction. A number of comments and suggestions were made which I have embodied in this report.

I wish to express my deep appreciation for the assistance, comments and criticism which I have received from the following:

J. Albright, Acting Chief Statistician, Census of Business, Department of Commerce, Washington, D.C.

P. Bengough, Vice-President of the Trades and Labour Congress.

H. J. Bird, President and General Manager of Bird Construction Company, Limited, Winnipeg.

W. D. Black, President of the Otis-Fenson Elevator Company, Limited, Hamilton.

M. Bodfish, Executive Vice-President of the United States Savings and Loan League, Chicago, U.S.A.

K. M. Cameron, Chief Engineer, Department of Public Works.

W. H. Carter of Carter-Halls-Aldinger Company, Limited, Contractors, Winnipeg.

A. W. Crawford, Director of Labour Relations, Department of Labour.

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R. England, Secretary of the Committee on Demobilization and Rehabilitation.

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H. C. Goldenberg, Director-General of the Economics and Statistics Branch, Department of Munitions and Supply.

H. Hereford, Controller of Records, National Selective Service, Department of Labour.

F. W. Herring, Assistant Director of The National Resources Planning Board, Washington, D.C.

A. F. Hinrichs, Acting Commissioner of Labour Statistics, United States Department of Labour, Washington, D.C.

E. H. Hoben, Associate Director of The National Association of Housing Officials, Chicago, U.S.A.

A. C. Jameson, Editor of The Daily Commercial News and Building Record, Toronto.

H. A. Kayes, Canadian Johns-Manville Company, Limited, Toronto.

B. W. W. King, Statistical Department, Bank of Nova Scotia, Toronto.

F. Leacy, Research Adviser's Assistant, Committee on Reconstruction.

D. Lewis, Secretary of The Co-Operative Commonwealth Federation.

W. H. Losee, Mining, Metallurgical and Chemical Statistics Branch, Dominion Bureau of Statistics.

G. Luxton, Research Department, Bank of Canada.

J. E. Mackay, Secretary, Committee on Reconstruction.

I. Markus, General Secretary of The National Construction Council of Canada, Toronto.

L. C. Marsh, Research Adviser, Committee on Reconstruction.

E. S. Milne, Vice-President of The Angus Robertson, Limited, Contractors, Montreal.

G. S. Mooney, Executive Director of The Canadian Federation of Mayors and Municipalities.

D. C. MacGregor, Professor of Economics, University of Toronto.

N. L. McKellar, Statistician, Dominion Bureau of Statistics.

A. L. Neal, Social Analysis Branch, Dominion Bureau of Statistics.

A. H. LeNeveu, Population Census, Dominion Bureau of Statistics.

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L. G. Ogilvie of Ogilvie & Company, Limited, Contractors, Montreal.

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J. C. Riley, General Manager of The Canadian Construction Association.

F. G. Rutley, Vice-President of The Foundation Company of Canada, Limited, Contractors, Montreal.

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G. E. Templeman, Chief Engineer of The Electrical Commission of the City of Montreal.

J. R. Walker, Editor of "Building in Canada", Toronto.

G. S. Wrong, Transportation and Public Utilities Branch, Dominion Bureau of Statistics.

I am also indebted to the Stenographic and Document Section of the Department of Pensions and National Health for arranging the stencilling of the report including the 20 charts which I have drawn, and to the staff of the Committee on Reconstruction for the checking of figures and typing my report.

Ottawa, November 1942.

O. J. Firestone, M.A., Ph.D.

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SECTION I.

INTRODUCTION

A number of problems are included in a study covering such a wide field as "The Construction Industry In Relation to Post-War Economic Policy". First of all, we have to agree on a definition of the term "construction industry". Then we have to know its size in pre-war days and its extension due to war conditions and its importance for the Canadian economy. We have also to concern ourselves with a breakdown of the activities of the construction industry, its contribution to other industrial activities in Canada, its importance as a field of employment and as an industry giving employment to the construction material and transporting industries. Likewise we have to deal with the construction labour force, its skill and training, its age and regional composition, occupational changes and seasonal fluctuations. In this connection consideration must be given to construction workers in the Armed Forces, their training, and the implication which the demobilization of construction workers will have on the Canadian economy in a post-war period. Finally, the organization of the Canadian construction industry and construction trade has to be considered, since our interest must be in an organization efficient enough to cope with a multitude of problems which might arise should construction activities increase considerably after the war.

It has been found advisable, because of the complexity of problems included in the study of "Construction Industry in Relation to Post-War Economic Policy", to use the following division of the field to be covered and to analyze the material gathered in six separate preliminary reports, the first one of which is contained in the present study.

I. The Importance of the Construction Industry in Relation to the Canadian Economy.

This report deals with the range of possible definition of construction employment and the effect of construction expenditure, and gives a survey of the part of construction activity covered in the available statistics; an analysis of the contribution of building and construction to the national income; an estimate of the gross value of all building and construction done in Canada, including the part not reported by the Dominion Bureau of Statistics; construction industry as a field of employment and the problem of direct and indirect employment; a comparison of the physical volume of construction with other industries (the steel industry, carloadings, total physical volume of business), indicating the particular sensitivity of construction to cyclical forces, and a comparison of the gross value of construction with the gross value of eight other main branches of production as reported in the survey of production by the Dominion Bureau of Statistics; some relevant comparisons with the construction industry in the United States, giving special information on the variations in the trend of construction industry in Canada and the United States for the period 1929 to 1938. The different contributions which the construction industry makes in this country and in the United States are quantitatively analyzed; secondary employment as a result of construction expenditure is discussed and other secondary effects of construction activity analyzed. A survey of views held by Canadians interested in this problem is included.

II. The Components of the Canadian Construction Industry.

(1) This report analyzes in relation to total construction the importance of

(a) construction industry proper, and
(b) the construction material supplying industries.

(2) It further gives a quantitative analysis of the importance of the different types of construction work divided into

(a) building construction (residential, industrial, institutional, etc.);
(b) engineering construction (streets, highways, bridges, etc.);
(c) building trades (plumbing, carpentry, electrical work, etc.).

(3) It also endeavours to give a statistical survey of provincial contributions to the total gross value of construction.

(4) This report includes information on the role of construction work directly undertaken by the public authorities.

This study, as a whole, might be useful for those charged with selecting construction projects for the post-war period and distributing them equitably throughout the Dominion.

III. The Organization of the Canadian Construction Industry and Construction Trade.

In this study the following topics are dealt with:

(1) The number of organizations representing the construction industry, their tasks and their structure.

(2) A quantitative analysis of contractors and working proprietors in construction occupations.

(3) The number of unions representing the construction craftsmen (carpenters, plumbers, etc.). A breakdown will be obtained.
(a) for the different trades, and
(b) for the provinces.

(4) A quantitative analysis of construction craftsmen who are members in trade unions and the unorganized construction labour force.

(5) A summary of views held by representatives of construction organizations as to the desirability of improving the organization of the construction industry.

This study might be useful for the purpose of supplying information on organized and unorganized persons in construction occupations and the possible improvements of the structure of these organizations. There is no doubt that a well-organized construction industry could take care of its problems with less government assistance than a badly organized construction industry.

IV. The Supply of Building and Construction Labour.

This report gives a quantitative analysis of past, present and future construction labour supplies on the following lines:

(1) The construction craftsman.

(2) The construction apprentice.

(3) The unskilled construction worker.

(4) The age distribution of the construction worker and, if possible, a regional distribution giving a provincial breakdown.

(5) Employment in construction industry and cyclical unemployment.

(6) The construction worker's wage.

This study should be of value in connection with the planning of a construction program, since such a task cannot be carried out satisfactorily without some information on the construction labour force available.

V. Construction Workers in the Armed Forces.

This study is being undertaken in cooperation with the Committee on Rehabilitation and Demobilization. It will contain a survey of skilled construction workers and apprentices in the armed forces, giving a breakdown of men in the Army, Navy and Air Force and according to provinces (based upon information obtained from the Manpower Records Office of the Ministry of Labour). It will also give the latest information on the number of construction craftsmen honourably discharged.

The report will also endeavour to determine the proportion of construction craftsmen in the armed forces in relation to the total construction labour force available.

Finally, a survey will be made of the views on possible contributions of the armed forces in the way of a preparatory training of construction labour for the post-war period.

This study may suggest some ways of building up a construction labour reserve.

VI. Some Aspects of the Possible Contribution of the Canadian Construction Industry to "Full Employment" in a Post-War Era.

This report is intended to sum up the findings contained in the reports I - V in the light of plans for post-war reconstruction and rehabilitation.

A survey of views on the possible contribution of construction industry to the post-war economy will be included.

This report may be useful to those charged with determining the role which building and construction can play in post-war economic policy.

While the research work described above is being undertaken, it is intended to build up a "Selected Bibliography of Literature on Building and Construction in Canada, Great Britain and the United States".

The completion of a final report containing a number of extensive studies as described above will take some time. It has appeared advisable, therefore, to publish preliminary reports, each dealing with a separate section of the problem involved. As soon as enough material is available for one section, it is analyzed and reviewed, and thereafter published in a preliminary report. These preliminary reports will be of assistance in surveying the conditions of the construction industry in each particular phase and in its components. It will naturally happen that new material will be obtained after a preliminary report has been published. When the field of "Construction Industry In Relation to Post-War Economic Policy" has been covered in a general way, these preliminary reports can be revised and a more complete final report be published if so desired.

The Desirability of Additional Information

A few examples are given below of important information which is not obtainable at the moment, but might be available in the near future:(1)

(1) The analysis of the Census of 1941; especially useful for information with regard to the structure of the man-power resources in the construction industry and with regard to the construction craftsman.

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(1) For a list of selected sources available containing original information on the construction industry, see Appendix III.

(2) The revised edition of a study on the National Income by the Dominion Bureau of Statistics, which contains much useful information on the importance of the construction industry in relation to the Canadian economy.

(3) An estimate of public expenditure for building and construction, 1929-1942. Such a study is essential for estimating the effect of Government spending through the medium of building and construction upon the business cycle. By analyzing the period 1929-1942 practically the whole of one Canadian business cycle would be covered:

(a) 1929 - The upper turning-point -- that is, the turn from prosperity to depression (down-turn, crisis in the technical sense);

(b) 1930-1933 - The down-swing (depression phase, contraction);

(c) 1934 - The lower turning-point -- that is, the turn from depression to prosperity (up-turn, revival).

(d) 1935-1939 - The upswing (prosperity phase, expansion).

(e) 1940-1942 - The war period.

The sources available have been surveyed. It appears that enough material can be secured to allow an analysis of the problems involved. Valuable help in undertaking such a study can probably be obtained from the Dominion Bureau of Statistics, which might be interested in securing the information above described. If such a study were to be undertaken, important information could be secured with regard to the importance which public spending on building and construction had on the Canadian economy in a major phase of the business cycle.(1) A few estimates of public spending on building and construction have been attempted in the past, but all those interested in the problem realize that only a thorough study of the problem will allow us to draw reliable conclusions.

There is no doubt that the question of public spending for construction purposes will become very acute in the post-war period. It appears that it might be helpful to base a future public works policy on the experience derived from studying the impacts of public works expenditure in the past. Attention is drawn to the fact that the accounts of the Department of Public Works show by no means the total expenditure for public works undertaken by the Dominion Government. Various other government departments undertake construction work directly and only the total of all these expenditures would give an approximate picture of public works spending by the Dominion Government. To that would have to be added funds loaned to the public for the purpose of encouraging private building and construction (e.g. financial aid under the Dominion Housing Act of 1935, the National Housing Act 1938, the Government Home Improvement Loans Guarantee Act 1937, etc.) and a number of grants made (e.g. grants through the Dominion Labour Department to the provinces and municipalities). To the spending of the Dominion Government would have to be added public works expenditure by the Provincial Governments and Municipalities. It is of importance to note that the total value of construction, shown in the Construction Census as "Dominion Government, the Harbours Board, the Provincial Governments, and the Municipalities", includes only construction work undertaken by the public authorities directly and gives no consideration to construction work undertaken

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(1) Mr. K.M. Cameron comments that such a study would supply us with useful information on the necessity of "public spending on construction for either maintenance of employment or for works necessary to keep pace with general improved economic conditions".

by private contractors for the public authorities. Since considerable work for the Dominion Government, the Provincial Governments, and the Municipalities is carried out by private contractors, it is evident that public works expenditure by the public authorities is considerably higher than indicated in the columns "Dominion Government, Harbours Board, the Provincial Governments, the Municipalities" in the Construction Census.

Information on this topic might also shed some light on the controversy as to whether public works expenditure competes with private construction or stimulates it. Mr. Livingston, the Chief of the Construction Unit of the United States Bureau of Foreign and Domestic Commerce, comments on this controversy that public construction "can be of a type which will encourage rather than stifle private enterprise. For example, highway construction (in the United States) in the twenties did not compete with private enterprise and did encourage the growth of the automobile industry. The big highway demand of the future is for better transportation into and around our big cities. It may be that this highway improvement can be handled so as to stimulate private enterprise in rebuilding our cities."(1)

The Main Aspects of the Present Study

There are two main aspects to a study dealing with "Construction Industry In Relation to Post-War Economic Policy". One deals with the importance which the construction industry has had for the Canadian economy in the past; the second with the importance which the construction industry could attain for the Canadian economy in a post-war era. It appears that the second can only be considered after the first has been exhaustively explored. If we are aware of the advantages derived from extensive construction activities and the deficiencies with which construction activities were carried out in the past, we can consider what the future place of the construction industry will be in a post-war economy. We might also be in a position to say what steps and measures can be undertaken to remedy deficiencies or lack of initiative in the past which, as some representatives of the construction industry and a few economists claim, has made it very difficult for the construction industry to take its proper place in a sound economy. It should be borne in mind, therefore, that preliminary reports Numbers I to V are intended to deal mainly with the structure and scope of construction activities and construction labour resources. The sixth report is intended to deal with the implications of the findings contained in the preliminary reports I to V for the post-war period.

The History and Implications of the Present Study.

The necessity for shedding some light on the "Importance of the Construction Industry in relation to the Canadian Economy" arose particularly in recent months.

Professor J.A. Coote prepared the report entitled "Impact of Wartime Controls on the Construction Industry" for the Committee on Reconstruction. The following statistics indicate some changes in components of the construction industry which Professor Coote used as illustrating the importance of the construction industry in relation to the Canadian economy:

(1) A comparison of the net production of the construction industry with total net production in Canada for the period 1923 to 1938. This table indicates that the minimum ratio of the net production of the construction industry to the total of net production in Canada was 3.06 percent in 1933 while the maximum was 9.75 percent in 1929. The average for the year 1923 to 1938 was 6.42 percent.

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(1) S.M. Livingston: "The Post-War Construction Market", an article published in the "Review of the Society of Residential Appraisers", Chicago, Volume VIII, No.8, August 1942, p.6.

(2) A comparison of the salaries and wages paid in private construction industry with the total of salaries and wages paid in Canada for the year 1926 to 1940. (Figures obtained from "National Income, A Study Prepared for the Royal Commission on Dominion-Provincial Relations" Appendix 4.). This table shows that the minimum ratio of all wages paid in private construction to the total of salaries and wages paid in Canada was 2.6 percent in 1934, while the maximum amounted to 7.4 percent in 1929. The average over the years 1926 to 1940 was 4.82 percent.(1)

These compilations were useful in shedding light on changes in some components of the construction industry, but neither the figure of 6.42 percent (average ratio of net production in the construction industry to all material industries) nor the figure of 4.82 percent (the average ratio of salaries and wages in the construction industry to the total of all salaries and wages earned in Canada) seemed to indicate fully the contribution which the construction industry has made to the Canadian economy in the past. The main reason is that the above compilations only pay attention to the income created in the construction industry as such (building and engineering construction and construction for maintenance purposes), omitting the contribution made by the industries which supply construction materials and transportation services. The second compilation of data deals furthermore with private construction only, giving no consideration to wages and salaries paid to persons employed on construction projects directly undertaken by the public authorities (the Dominion Government, the Harbours Board, the Provincial Governments and the Municipalities(2). It was deemed necessary to consider also the activities of the industries supplying and transporting construction materials as well as public construction in order to attain a fair appraisal of the position which the construction industry occupies in the Canadian economic structure.

Dr. L. C. Marsh, the Research Adviser of the Committee on Reconstruction, suggested that a ratio of approximately 10 percent representing the number of people depending directly for their livelihood on building and construction (construction proper and the construction material supplying and transporting industries(3)) would probably be a more correct assumption than the figures available in Professor Coote's report. In July 1942 Mr. Cameron, the Chairman of the Sub-committee on Post War Construction Projects, mentioned the assumed figure of 10 percent in a meeting with members of the Management Committee of the Canadian Construction Association. It was felt among the members of the Canadian Construction Association that more than 10 percent of the total earning population in Canada depended for their livelihood on the construction industry.

These views were reflected in the following editorial written by Mr. A.C. Jameson which was published in the Daily Commercial News on the 16th July, 1942. Mr. Jameson commented thus:

"Construction, The Job Provider."

"Members of the Management Committees of the Canadian Construction Association who were present at Tuesday's meeting in Ottawa, must have learned with surprise that the efficacy of their industry as a creator of employment is still apparently doubted in some quarters. Mr. K. M. Cameron, Chief Engineer of the Department of Public Works and a member of the James Committee on Reconstruction, said that he had heard it suggested that only about one-tenth of the

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(1) For Tables see Appendix I.

(2) Definition taken from the Construction Census published by the Dominion Bureau of Statistics.

(3) For explanation of terms see Section II.

Dominion's population, as against the much larger proportion usually claimed, depended upon it for a livelihood. Mr. Cameron did not express this as a personal opinion, and indeed couched his statement in such a way as to indicate that he does not entertain it.

"In view of the results of the emergency public works construction programs of 1934 and 1935, and of the operation of the National Housing Act and the Home Improvement Plan upon the Canadian economy -- to say nothing of our observations of experiences elsewhere -- it is hard to understand that this old question could have been reopened. All of the recovery of the 1930's, which was interrupted by the outbreak of war, dates from and is directly traceable to these measures. Two of them were recommended by a Royal Commission headed by the late A.B. Purvis as a specific for wide-spread unemployment. This commission based its conclusions upon a most exhaustive examination of facts, and they were fully sustained by subsequent developments.

"On several occasions, as a matter of fact, the work-giving potential of the construction dollar has been determined quite accurately. In 1935, for example, the Carter-Halls-Aldinger Company, Limited, made a careful analysis of the expenditure on the new Dominion Public Building in Winnipeg. It showed that 80 percent of the contract, or $1,134,300 had been spent on labour, $423,300, or the equivalent of 705,820 man-hours on the job itself, and $711,000 or the equivalent of 1,375,360 man-hours in the production, manufacture, fabrication and transportation of materials to the site. That is to say, a total of 2,081,180 man-hours of labour were produced on this one building, equalling the employment of 1,300 men for a period of 200 days."

Though this editorial does not say what the actual contribution of the construction industry to the national income is, nor what importance this particular industry has for the field of employment, it expresses the feeling of the construction industry that its contributions to economic activity in this country are greater than the assumed estimate mentioned by Mr. Cameron. A close inquiry into this question seemed, therefore, advisable. This preliminary report endeavours to answer the question: "What is the importance of the construction industry in relation to the Canadian economy?" The views held by a number of institutions and persons interested in the Canadian construction industry were embodied in this report in order to present a cross-section of Canadian opinion on the problem herein dealt with.

There are several methods of approaching this problem. In the following sections are described a number of methods which can be used to indicate the contribution of building and construction to the Canadian economy.

Certain aspects illustrating the importance of the construction industry in relation to the economic structure of a country are measurable, while others are not measurable. Those measurable aspects can mainly be analyzed by comparing the contribution of building and construction to the total of all economic activity in a country; for example, a comparison of (a) the net income originating in construction with the total net national income(1), (b) the gross value of construction with the total gross national income(2), (c) wages and salaries paid in the construction industry with the total wages and salaries paid(1), (d) wage earners in the construction industry proper and the construction material supplying and transporting industries with the total of all wage earners(3), and (e) all persons gainfully occupied in construction industry proper and the construction material supplying and transporting industries with the total of all gainfully occupied(3).

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(1) This method is developed in Section III.

(2) Ibid., Section IV.

(3) Ibid., Section V.

However accurate the above comparisons may be, they do not give a complete picture of the effects of construction expenditure upon the economy of a country. As said before, there are other effects which cannot easily be measured and which economists call "secondary effects" of construction expenditure. It is clear that the construction industry, like other industries, is not an isolated unit of our present-time economy. It plays an important part in determining the ups and downs of business activities, generally described as the business cycle. The construction industry is one of the main durable goods industries and represents one of the foremost channels for real investment. Consequently it is an important outlet for absorbing savings and transferring them into new income, thus creating new employment. It has also to be borne in mind that increased construction activity does not only mean increased direct or indirect employment(1) in the construction industry proper, but also increased employment in a number of other industries, generally described as consumer goods industries.

What happens is simply this. When the construction industry expands, it gives employment to more persons either directly employed on the construction project itself or indirectly to persons employed with industries supplying construction material and services. An increase in the number of persons either directly or indirectly employed in the construction industry means that these additionally employed persons will have an income to spend which otherwise they would not have had. It might also be possible that, though there is no increase in the number of persons employed in the construction industry, an increase in the income derived from employment in the construction field takes place, in other words, the wage level is raised. Furthermore, contractors and concerns furnishing construction material and supplying services will have additional revenue at their disposal due to the increased construction activity. Though part of these funds will be saved, the major part will be used for purchases which will primarily affect the consumer goods industries and thus create additional employment. The employment created in the durable goods industries, among which the construction industry is counted, is usually described as "primary employment", while employment provided in the consumer goods industries is described as "secondary employment".

It has, as yet, not been found possible to measure exactly the size of secondary employment for a particular industry or a chosen period. Some views held on this problem are discussed in Section VIII. They may suffice to make us realize that it is necessary not only to consider the measurable effects of construction activities but also their secondary effects, if we want to appraise the importance of the construction industry in relation to the Canadian economy.

If we bear in mind the above qualifications, which are discussed more in detail in the following sections, an explanation can easily be given of the misinterpretation of Mr. Cameron's statements by some members of the Management Committee of the Canadian Construction Association.

When we talk of construction industry as a field of employment or, as it is put in the editorial in the Daily Commercial News, "that only about 1/10th of the Dominion's population .... depend upon it (construction industry) for a livelihood", then reference is only made to persons who find direct employment in construction proper and indirect employment in the construction material supplying and transporting industries. This range of employment is sometimes described as "primary employment".(2)

The editorial in the Daily Commercial News quite evidently refers to construction as a "job provider", a phrase intended to include the secondary effects of construction expenditure. It is quite clear that the sum of primary employment and secondary employment is considerably greater than primary employment alone.

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(1) For a definition of terms see Section II.

(2) For the definition of the terms direct and indirect employment see Section II.

The relationship of wages and salaries paid in the construction industry and in the construction material supplying and transporting industries to the total of all wages and salaries paid in Canada is analyzed in Section III. It is found that, as an average for the period under consideration, 10.6 percent of wages and salaries[1] paid in Canada were earned by persons employed as wage and salary earners in the construction industry and the construction material supplying and transporting industries.

The analysis of the wage earners in the above-mentioned group of industries concerned with construction showed that, for the period 1936-1940, employment was provided on an average for 11.2 percent of all wage earners. (See Section V).

It appears in the light of these calculations that Mr. Cameron's statement that only about 1/10th of the Dominion's population depended upon construction activity for their livlihood, appears to be in the light of the above calculations a very good appraisal of the construction industry as a field of direct and indirect employment. It must again be emphasized that Mr. Cameron did not refer to the secondary effects caused by construction expenditure.

Summarizing, it may be said that the above-mentioned ratio intend only to cover the primary employment created by construction expenditure which are measurable. The importance of secondary employment in consequence of increased primary employment in the construction and related industries must be recognized, although it is not yet possible to give an exact quantitative analysis of the impact of primary upon secondary employment.[2]

In conclusion, it may be remarked that this study deals by no means with all possible angles of the contributions which the construction industry has made to the Canadian economy in the past but consideration has been given to all main aspects of the problem which is the subject of this report.

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(1) This excludes receipts of individual enterprisers.

(2) For estimates of J. M. Keynes and others see Section VIII.

SECTION II

RANGE OF POSSIBLE DEFINITIONS OF CONSTRUCTION EMPLOYMENT AND EFFECTS OF CONSTRUCTION EXPENDITURE.

The term "building and construction" has been used in reference to such a great variety of economic activities that it is essential to discuss its various meanings and to agree on an appropriate definition before analyzing the importance of the construction industry in relation to the Canadian economy.

In its narrow sense the term "building and construction" includes in the first instance the economic activity of private firms and individual entrepreneurs engaged in construction work and building. This includes general contractors, sub-contractors, firms which engage in work not connected with the construction industry but which carry out construction work with their own employees, and farmers and house-owners who do construction work on their own premises either by themselves or with their hired help. For the sake of convenience this group will be referred to as group A.

Sometimes a distinction is made between (a) trade construction, including general contractors and sub-contractors who perform construction work professionally; and (b) construction on own account, including firms which engage in work not connected with the construction industry, but which carry out construction work with their own employees; farmers and house-owners who do construction work on their own premises either by themselves or with hired help.

Secondly, there is the construction activity of government bodies (Dominion Government, provincial governments, municipalities); and, thirdly, of utilities (railway companies, telephone and telegraph companies, gas and electric companies). These are referred to hereafter as groups B and C respectively.

Sometimes the activity of these firms, entrepreneurs, government bodies, and utilities is described as (1) private construction (group A); (2) public construction (group B); (3) semi-public construction, (group C).

The term "construction proper" is sometimes used to define the construction activity described above.

In its wider sense, however, the term "construction" is often used as implying the inclusion of two components: (a) construction proper", (group A. B. and C. as defined above); and (b) the industries supplying construction materials and related equipment, and the transportation services necessary to deliver construction material to the site. (These may be conveniently referred to on occasion as groups D. and E.).

In this report the word "construction" will be used to mean 'construction proper" as above defined. To indicate the second component of the term "construction" in its extensive meaning, the phrases "the industries supplying and transporting construction materials" or occasionally, the "auxiliary industries" will be used.

It is of great importance to distinguish between what has been now described as construction in its extensive meaning, and the range of economic effects of construction expenditure. An increase of activity in building and construction will cause a greater demand to be exerted on the industries supplying and transporting construction material and thus indirectly affect a number of industries third, fourth, or more removed from the original construction work. The industries thus affected by an increase of construction activity include

(1) the appliance industries supplying, for example, refrigerators, electrical equipment, furnaces, etc.;

(2) the furniture industry and other durable consumer goods industries such as carpets, silverwares, etc.;

(3) the industries providing machinery, tools and other equipment to the construction industry and to the industries supplying and transporting construction materials. The processing industries, e.g., steel mills, are included in this category;

(4) industries supplying the raw material required by the construction-material-supplying industries. e.g., mines, lumber industry, etc.

It will therefore be useful to remember that these industries third, fourth or further removed from construction proper are not included in the term "construction" in its extensive meaning, but are described as indirectly affected by the activity of the construction industry and the industries supplying and transporting construction materials.

We speak frequently of "construction" as a field of employment. In using this phrase we have to distinguish betwen persons employed in what has been termed "construction proper", and persons employed in the "industries supplying and transporting construction materials". In the former case it is convenient and descriptive to speak of persons "directly employed" or of persons employed "on-site". Sometimes the phrases "direct employment" or "on-site employment" will be therefore used to indicate the scope of employment. Persons working in the material supplying and transporting industries are similarly describable as "indirectly" employed or "off-site" workers. Again we speak of "indirect employment" or "off-site employment" provided by activities of the industries supplying and transporting construction-materials. The importance of this distinction has been stressed in a number of studies and will be discussed more in detail in Section V. A study prepared by J.K. Galbraith and others for the National Resources Planning Board refers to direct and indirect employment by distinguishing between "the employment at the site of construction and the employment directly attributable to the construction project but which is provided away from the site, primarily in the manufacture and transportation of the materials. On-site and off-site employment together constitute the identifiable effect of public construction on the volume of employment. They do not constitute the total effect of such construction, since additional employment is generated by the expenditure of the wages and incomes received by those engaged in construction or the supplying of materials. These further effects are not statistically identifiable" and can therefore be treated qualitatively only.(1)

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(1) J. K. Galbraith assisted by G.G. Johnson Jr.: The Economic Effects of the Federal Public Works Expenditures 1933-1938, a study prepared for the National Resources Planning Board, Washington, 1940, pp. 38-39.

What Mr. Galbraith has called "further effects" of public construction on the volume of employment which "are not statistically identifiable", have been called in this study the "secondary effects" of construction expenditure. These effects are discussed in Section VIII.

Mr. A. C. Jameson, the editor of the Daily Commercial News and Building Record, referred to direct and indirect employment in the construction industry in a memorandum on "Construction for the Creation of Employment" to which the writer was kindly given access:

"Each construction operation involves the assembly on the site of materials that have probably been fabricated elsewhere.

"For example, into a house erected in Toronto there might enter (a) cement milled in St. Mary's, (b) bricks burned in Milton, (c) steel beams rolled in Hamilton, (d) doors and window frames cut in New Liskeard, (e) bathroom fixtures cast in Port Hope, (f) furnace built in Ingersoll, (g) glass rolled in Montreal, (h) shingles cut in Vancouver, and so forth.

"An even more diversified bill of goods would enter into a 'monumental building' such as a city post office.

"On the other hand, an engineering project, viz., a bridge, a dam or a highway, would not require such a variety of materials.

"In modern construction machinery is used extensively, the amount varying with the size and nature of the job and engineering works, generally speaking, necessitating the employment of machinery to a much greater extent than buildings. It is understood, for example, that the McNamara Construction Company, Limited, of Toronto, took equipment valued at more than $1,000,000 into Labrador to be employed on construction of an air field at Hamilton Inlet; this could be confirmed through the Department of Transport, and indicates the importance of machinery in construction operations.

"From the above it is obvious that such an operation in addition to providing a certain amount of labor on the site itself also creates opportunity for employment in plants devoted to the manufacture of building materials and equipment and among the agencies that transport these from the factories to the field.

"It is also obvious that the production of any material or piece of construction equipment is responsible for still further employment in factories, mines, forests and transportation."

The editor of "Building in Canada", a quarterly journal published in Toronto, emphasizes on various occasions the importance of the building trade for the industries supplying construction materials and transportation services. In an editorial which appeared in the Spring Number 1940 of "Building in Canada" the following answer is given to the question of where the money spent for building purposes goes: "It has been found that more than thirty different trades or occupations are represented in the construction of a finished residence .. and a dozen different kinds of materials".(1)

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(1) "Building in Canada", Toronto, Spring Number 1940, p. 3.

Estimates of the ratio of direct and indirect employment will be dealt with in Section V. Here it may only be said that this ratio plays a quite important part in calculating the total volume of employment affected by the construction industry. We can usually measure direct employment. By applying a ratio of direct to indirect employment we can calculate indirect employment and thus estimate the total employment provided by construction expenditure.

When speaking of persons employed in the construction industry, we have to bear in mind that this phrase includes professional men, (e.g., architects), tradesmen, (e.g., carpenters and carpenters' apprentices), and unskilled workers, (e.g., men digging ditches). We have to distinguish between these persons employed in construction industry and what has been described as "construction occupations". The Population Census made by the Dominion Bureau of Statistics for 1931 enumerates as construction occupations the following:

Owners, mangers, builders and contractors,
Foremen and overseers,
Brick and stone masons,
Brick and stone masons' apprentices,
Carpenters,
Carpenters' apprentices,
Cement finishers,
Electricians and wiremen,
Electricians', wiremen's apprentices,
Painters, decorators, and glaziers,
Painters' apprentices,
Plasterers and lathers,
Plasterers' and lathers' apprentices,
Plumbers, steam fitters, and gas fitters,
Plumers' apprentices,
Roofers (not metal) and slaters,
Sheet metal workers and tinsmiths,
Sheet metal workers' apprentices,
Structural iron workers and steel erectors,
Other tradesmen employed in construction industry.

The main and most detailed sources for statistical information on construction work in Canada are the annual "Reports on the Construction Industry" prepared by the Census of Construction Branch of the Dominion Bureau of Statistics. The first construction census undertaken in Canada was in 1919. Another was taken in 1920 and then discontinued until 1934 when a new basis for the census on construction was established. However, it was not before 1935 that this basis was standardized and it appears that comparable statistics are only available from 1935 onwards.

The Dominion Bureau of Statistics made clear in the Report on the Construction Industry in Canada, 1934, that "the organization of a Census of Construction has not proved an easy task. At the outset, a basic list of contractors, builders, etc. was difficult to secure, especially under recent unsettled conditions when numerous operators had gone out of business and new concerns were springing up almost continuously. Directories cover the larger centres only. With the aid, however, of such publications as the Daily Commercial News & Building Record, Engineering and Contract Record, Building in Canada, MacLean's Reports and other construction periodicals, an accurate and comprehensive list of contractors and builders throughout Canada has been established and future reports should be on a reasonably uniform basis. With regard to the smaller subcontractors, whose annual operations amount in most cases to only a few hundred dollars, it has been found impossible to secure an absolutely comprehensive return.

"The schedules were planned to elicit the required

information with the least possible inconvenience to the construction industry. Two objectives were sought: first, that the Census of Construction should form an integral part of the data collected in the Bureau with regard to other industries; secondly, that only such information should be collected as is absolutely necessary to present a rounded account of construction operations. In the main, only such information was requested as a contractor would assemble and compile before submitting a tender. It is realized that the details of the schedule may not apply in each and every case to the many diverse occupations composing the Construction Industry, but it is believed that it can be adapted to most with slight modification.

"As a special difficulty encountered, it may be mentioned that in the structural steel, sheet metal, ship-building, bridge building and wood-working plants, a large amount of construction is carried on as a secondary operation. The aggregate value of this construction is large, yet it is not easy to obtain separate and detailed figures covering construction operations only. In the case also of certain large manufacturing plants who undertook alteration and repair work with their factory employees, in an effort to retain and provide employment for the latter, records have been particularly hard to obtain."(1)

According to the Canadian Year Book 1941, the field covered by the Construction Census is described as follows:

"The annual Census of Construction undertaken by the Dominion Bureau of Statistics covers all construction, maintenance and repair work undertaken by contractors, builders and public bodies (except the smaller municipalities) throughout Canada. It does not include maintenance and repair work on steam and electric railways, telegraph and telephone systems and the lesser public utilities when such work is done by the employees of these concerns in the ordinary way: nor can it include a substantial amount of construction in the aggregate done by farmers and other individuals who might be otherwise unemployed, performing work on their own structures. It is doubtful whether a great deal of the work of railways and utilities is construction in the sense understood in the census: for instance, the routine 'maintenance of way' expenditures, so far as they relate to inspection work, are not construction although, so far as they concern rebuilding of line for road-bed or structures, they might be said to fall in that category."(2)

In addition to the Construction Census a great number of official and private publications deal with the problems and scope of building and construction in Canada. A list of publications which have been consulted in connection with the study will be found in Appendix III. It may be said that there is no agreement with regard to the use of the term "construction" in these different publications. It appears that the misunderstandings which occur with regard to the scope of construction as a field of employment, are mostly due to the different uses of the term "construction".

This preliminary report has been based, as far as construction data are concerned, mainly upon the statistics available in the annual reports on the construction industry prepared by the Construction Branch of the Dominion Bureau of Statistics. It is important to bear in mind the limitations of these reports. They give a practically complete picture of the construction work done by general contractors, sub-contractors, the Dominion Government, the Harbours Board, the Provincial Governments, and the municipalities. The construction work reported under "general contractors and sub-contractors" includes,

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(1) Dominion Bureau of Statistics, Census of Construction: "Report of the Construction Industry in Canada 1934", Ottawa, 1936, pp. 1-2.

(2) The Canada Year Book 1941, issued by the Dominion Bureau of Statistics, Ottawa, pp. 375-376.

(1) work performed by general contractors and sub-contractors for private individuals and firms;

(2) work performed by general contractors and sub-contractors for government bodies and utilities;

(3) work performed by some utilities on own account, e.g., the hydro and gas companies;

(4) work performed by firms which engaged in work not connected with the construction industry but which carry out construction work with their own employees and buy construction material for this purpose, e.g., certain oil companies.

On the other hand the information contained in the Construction Census is incomplete with regard to

(1) certain utilities, e.g., construction work done by the telephone and telegraph companies, and the railway companies;

(2) a number of firms which do their own construction and maintenance work with their own employees;

(3) a number of working proprietors or workers on own account, especially if the volume of business being done is very small, e.g.,carpenter in a village.

It should, however, be noted that the Construction Branch of the Dominion Bureau of Statistics endeavours to give a most complete survey on the construction activities in Canada which it covers in its annual reports. Continually new firms or small entrepreneurs, as described in (2) and (3), are tracked down and the volume of the work included in the annual reports. The extent of the work done by the Construction Branch may be realized from the fact that for the year 1940 12,849 reports were analyzed which is nearly twice as many as the number of reports received in 1935 when the compilation for the Construction Census was standardized. There were 7,689 reports received in 1935.

The report on construction industry does not include statistics for

(1) construction work (repairs or new construction) done by farmers themselves or with the assistance of hired help.

(2) other small construction work, repair of houses, other than farm houses, done by the owners or tenants themselves.

An estimate of what part of construction activity in Canada is covered by the Construction Census and what part is not covered will be found in section IV.

An effort has been made to show in a chart (Figure I, at the end of this section), the range of possible definition of construction employment and the effects of construction expenditures. In a sense this part is a diagrammatic summary of the differences of definitions already enumerated at some length in this section. It may be emphasized that it is merely diagrammatic and not a drawing of a scale showing exact relative sizes. But confusion of terminology is so common that a concrete representation is very helpful. What this diagram does, is to show three things:

(1) The range of definition of construction industry,

using the volume of construction as reported in the annual Census on Construction by the Dominion Bureau of Statistics as the basis. (1 a - g)

(2) The range of the effects of construction expenditure upon the Canadian economy. These effects are divided into:

I. those caused by direct employment (see circle 1);

II. those caused by the total of direct and indirect employment (see circles 1 and 2);

III. those caused by the aggregate of all construction and building components (see circles 1 - 6);

IV. those caused by the aggregate of all construction and building components and the effects of wage expenditures (see circles 1 - 7).

(3) The statistics and estimates available which might assist in estimating the importance of the construction industry in relation to the Canadian economy. Thick lines in the chart indicate "statistics available", broken lines indicate "estimates available", and thin lines indicate "statistics not available".

A simile may perhaps further clarify the chart. Assumed we create a disturbance by throwing a stone (shown by circle 1 in the chart) into the center of a small pool (shown by circle 9 in the chart). Immediately there will be a series of ever-widening but concentric ripples, which will be clearly marked near the center and increasingly less marked the further away they are from the center. This is exactly what happens when an increase of construction activity takes place. It will in the first instance affect the direct employment in the construction industry (shown as I in the chart). The next strongest impact will be on indirect employment provided by the industries supplying and transporting construction materials (shown as II in the chart). The effect upon employment in industries third and fourth and further removed from direct construction work, e.g. the machinery, equipment and processing industries, and the raw material providing industries (shown as III in the chart) will differ in degree according to impact upon the employment in the industries supplying and transporting construction materials. Similarly, an increase of employment in direct construction will affect the consumer goods industries (shown as IV in the chart), though the impact will again differ in degree from that upon the other industries mentioned above. Finally, an increase of construction activity will influence the economic activity of the country as a whole (shown as circle 9 in the chart).

It is important to keep the range of definitions of "construction" in mind if one wants to avoid misunderstandings due to a different use of the terms "construction" or "building". In the following an example is given of an American definition of "building industry" which shows the great range of industries included under the term "building industry". This definition is taken from a pamphlet entitled "New Career Opportunities in the Building Industry" by Arthur H. Hood:

"The building construction or shelter industries embrace the second largest segment of American life--with 27.8 per cent of the consumer's expenditures, while the largest--that of agriculture and food groups, accounts for 28.3 per cent of the consumer's dollar.

"The building industry represents in reality two industries--heavy construction and light construction.

"Heavy construction may be segregated as including roads, bridges, railroads, canals, dams, factories, public and office buildings, which require heavy construction machinery for erection. In dollar value

such projects run from $20,000 up to hundreds of millions of dollars on a single contract.

"The light construction industry on the other hand embraces homes, farm buildings, stores, garages, small industrial buildings of all kinds and the general field of structural repair, remodeling and improvement. The dollars and cents value of contracts in this division of the industry runs from $1.00 to $20,000 and the largest single item is, of course, the American home.

"In normal years this housing field, or to use its other name--the light construction industry is equal to heavy construction in dollar volume as each division represents about 50 per cent of the total construction volume.

"The light construction industry has three major markets: that for new homes, that for structural improvements, and that for farm buildings.

"It has enjoyed an annual volume as high as 6 billions of dollars and its annual post-war potential is probably twice that figure. The U.S. Dept. of Commerce has recently estimated the dammed-up demand for housing will reach 40 billions of dollars by 1945.

"This light construction industry has seven supply divisions: those of machinery, materials, labour, land, utility, credit and equipment, and paralleling management divisions in production, distribution, finance,installation and marketing.

"The U.S. Dept. of Labor lists 1200 separate occupational classifications in the construction trade alone embracing a normal total employment of 3½ million men.

"At least another million are normally employed in building industry manufacturing establishments and still another million in the distribution and service industries.

"The one hundred separate industries listed below which together make up the building industry in total, indicate the wide opportunity for the careerist in this industry.

"The building industry uses the term 'Housing Arts' to designate all the techniques and skills involved in the designing, planning, selling, erection, equipping and financing of homes, farms, farm structures, small industrial buildings, and the renovation or alteration of existing structures."

Out of 100 industries which, according to Arthur A. Hood, "make up the building industry in total" a few have been selected in order to show the great range of possible definitions of the terms "construction industry" and "building industry": "Banks, Brokers, Chain Store Operators, Cork Products, Financing, Hardware, Home Loan Banks, Home Owners Loan Corp.

Insurance (5 types), Plastics, Radios, Research Agencies, Retailers, Rubber Products, Stokers, Trade Unions, Utilities (5 types), Wholesalers".(1)

It appears that this definition of the building industry goes much further than the normal use of the term "construction industry" or "building industry" would warrant. For example, in this definition banks and research agencies are included to belong to industries "which together make up the building industry in total". Though there is no doubt that banks and research agencies render at times services to the construction industry, it does not appear appropriate to include them under the heading "building industry". Similarly we would not consider the hardware industry a part of the shoe industry just because some hardware industries produce shoe nails. If we really would be willing to accept Mr. Hood's definition of the building industry, we would also have to include the activities of government agencies under the heading of building industries because some government agencies render services to the building industry at times.

On the other hand, it might be appropriate to use occasionally, like Mr. Hood, the phrases "heavy construction industry" referring to construction of roads, bridges, railroads, canals, etc., and "light construction industry" referring to construction of homes, farm buildings, stores, etc., and to the general field of structural repairs and improvements. The relative importance of heavy construction and light construction in Canada will be discussed in a separate report entitled "The Components of the Canadian Construction Industry".

In conclusion it may be said that it is important to bear in mind what has been said about the range of possible definitions of building and construction. It will be advisable in every particular case to agree on a definition of construction first before entering into a discussion of the problems covering the field of construction activities.

As an expository device it has been found helpful to explain the range of possible definition of construction employment and effect of construction expenditure in the schematized way suggested above and by using a simile. It is of great importance, however, to realize that what has been said about the range of effect of construction expenditure does not apply to the construction industry alone but applies equally to other durable consumer goods and producer goods industries, though the effect of increased expenditure in different industries varies in different degree. It would be short-sighted to believe that economic recovery of the country could be secured by an incoherent and one-sided expansion of one industry at the expense of other industries and equally unwise to utilize only one industry as the source of stimulus. Only a proper co-ordination of all economic activity in a country will contribute to economic recovery or "full employment" as desired for the post-war era. It is true, however, that for a number of reasons the construction industry has a special claim for consideration as an industry "stimulating economic recovery". The possible constribution of this industry to "full employment" in the post-war period will be discussed in a separate report entitled "Some Aspects of Possible Contribution of the Canadian Construction Industry to 'Full Employment' in a Post War Era".

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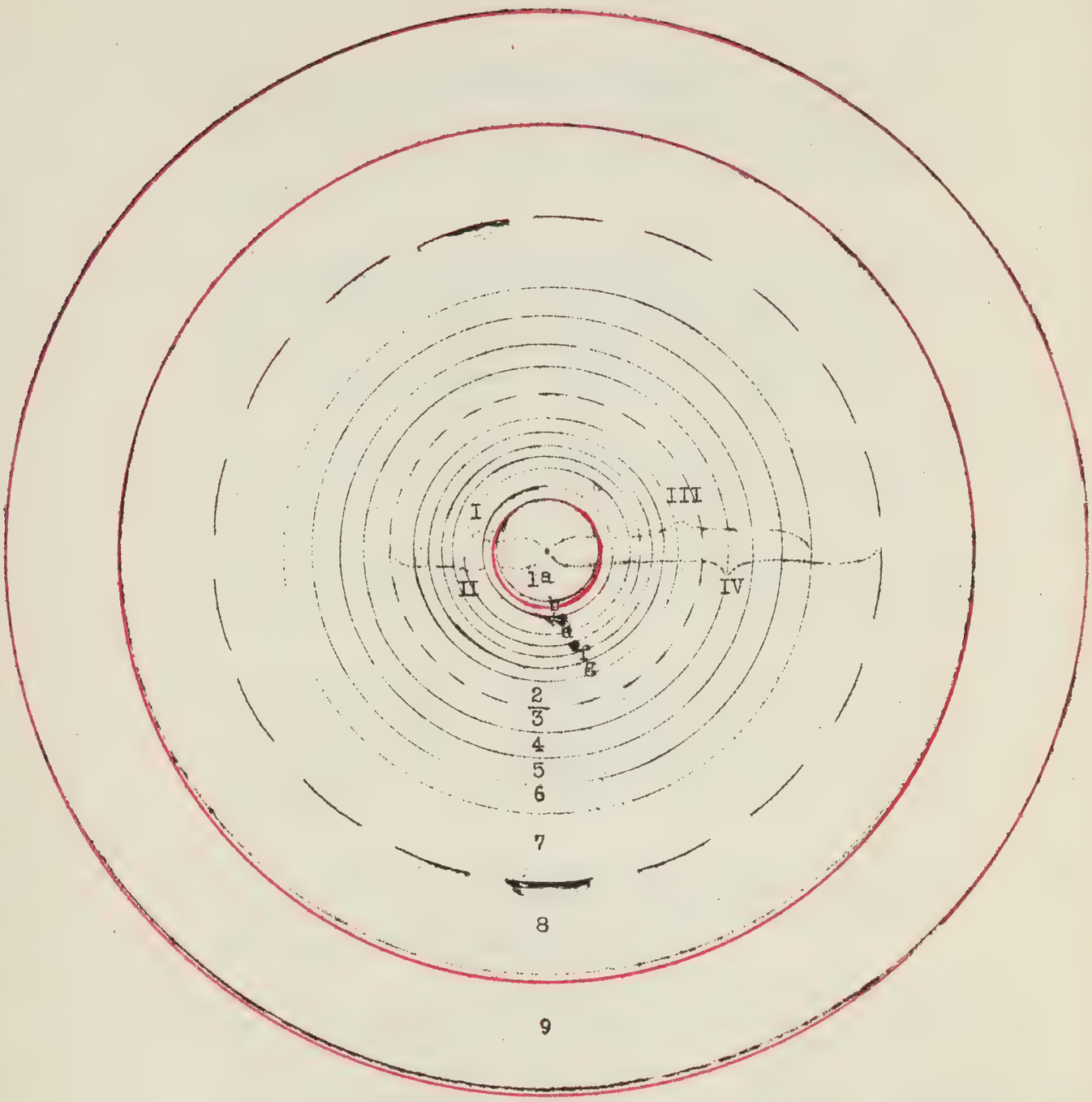
(1) Arthur A. Hood, Director of Dealer Relations of the Johns-Manville Corp.: "New Career Opportunities in the Building Industry for High School Graduates Planning to Enter College", New York, 1942, pp.6-7.

FIGURE I

RANGE OF POSSIBLE DEFINITION OF CONSTRUCTION EMPLOYMENT AND EFFECTS OF CONSTRUCTION EXPENDITURE



Note: Chart diagrammatical only.

Statistics available.

Statistics not available.

Estimates available.

RANGE OF POSSIBLE DEFINITION OF CONSTRUCTION EMPLOYMENT AND EFFECTS OF CONSTRUCTION EXPENDITURE.

Explanation of Figure I.

1. (a) Persons directly employed by contractors solely concerned with construction, and persons employed on construction projects directly conducted by government bodies and utilities; new construction, repairs and maintenance; data available in Construction Census of the Dominion Bureau of Statistics.

   (b) Persons employed by firms which engage in work not connected with the construction industry but which carry out construction work with own employees and buy construction material for this purpose. These firms, with a few exceptions, such as oil companies, are not included in the Construction Census, e.g. mines, logging industry. This work has been called "force account work".

   (c) Persons employed with the railway companies doing railroad construction, repair and maintenance work. This type of construction is not included in the Construction Census.

   (d) Persons employed with the telephone and telegraph companies which do construction work on their own account, e.g., Bell Telephone Company; not included in the Construction Census.

   (e) A number of working proprietors or workers on own account, e.g., carpenters in a village; not included in the Construction Census. Some of these workers may on occasion come in groups (b) - (d); an estimate of the size of construction work not reported by the Dominion Bureau of Statistics (b, c, d, and e) has been made by the writer in Section IV.

   (f) Persons doing part-time construction work on farms, e.g., the farmer repairs his house or stable himself or with the assistance of hired help and buys construction material; not included in Construction Census.

   (g) Home-owners or tenants - other than farmers - who undertake their own construction and repair work and buy construction material for that purpose; not included in Construction Census; an arbitrary assumed figure designed to allow for incomplete statistical coverage of work on all farm buildings, on dwellings other than on farms and on stores and other buildings (f and g) has been suggested by Professor D.C. MacGregor; see Section IV.

2. Persons gainfully occupied in the industries supplying and transporting construction materials, usually described as persons "indirectly employed" in construction industry.

3. Persons gainfully occupied in industries, third removed from direct construction work, which supply the industries described in 2, 5 and 6 with machinery, tools, and other equipment. The processing industries, e. g., steel mills, are included in this category.

4. Persons gainfully occupied in industries providing the raw material required by the construction material supplying and other related industries, e.g., mines, lumber industry, etc.

5. Persons gainfully occupied in the appliance industries, e. g., refrigerators, electrical equipment, furnaces, etc.

6. Persons gainfully occupied in the furniture industry and other consumer durable goods industries, e. g., carpets, silverwares, etc.

7. Secondary employment in the consumer goods industries other than described in 6, created through expenditure of wages and salaries paid to persons employed in the industries described above.

8. Total number of "wage-earners" as defined in the Population Census for 1931 by the Dominion Bureau of Statistics (Vol.V). The term "wage-earner" includes all persons who work for salaries or wages irrespective of the nature of employment.

9. Total number of "gainfully occupied persons", including "own account workers", who practice a trade or profession unassisted, "employers", who employ others in conducting their own business, and "unpaid family workers", who are employed without pay on work which contributes to the family income, as do many farmers' sons. Definition taken from the Population Census of the Dominion Bureau of Statistics, 1931, Vol. VII.

I. Direct employment; shown in chart as circles 1 a-g.

II. Total of direct and indirect employment; shown in chart as circles 1 and 2.

III. Total effects of construction and building components; shown in chart as circles 1 - 6.

IV. Total effects of construction and building components and effects of wage expenditures; shown in chart as circles 1 - 7.

SECTION III

CONSTRUCTION AND THE NATIONAL INCOME.

The main difficulty in comparing Canadian national income estimates with the national income originating in building and construction is to compare like with like.

One possibility consists in comparing net national income with the net income originating in building and construction. There are several reliable estimates of national income available but the statistics for income originating in construction activities are incomplete. Calculations made by the Dominion Bureau of Statistics and other computors deal only with the income originating in construction as reported in the Construction Census for 1934 and subsequent years. For the years previous to 1934 the estimates are mainly based on construction data made available by MacLean's Building Reports. The field thus covered is only a fraction of all construction activity in Canada and has been shown as circle 1, a in Figure I. Not included is other construction work done by firms (e.g. mining and logging) which engage in work not connected with the contract construction industry but which carry out construction work with their own employees, the work done by railway companies, telephone and telegraph companies, the work done by a number of working proprietors and workers on own account not included in the Construction Census, and farmers and home owners who do construction and repair work on rural and urban dwellings. This type of work has been shown as circles 1, b-g in Figure I. Furthermore, in computing income originating in the construction industry no consideration is given to the fact that it is due only to the activity of this industry that the construction material supplying and transporting industries are kept busy. In other words, no consideration is given to the income originating in the construction material supplying and transporting industries. If we desire to obtain a complete picture of the contribution which construction activity in this country makes to the national income the above considerations will have to be taken into account.

Another possibility consists in comparing the gross national income, also called the gross product, with the gross value of construction. The difficulties of this method for Canadian conditions are apparent when we consider that there are at the moment only very tentative estimates of the gross national income available. The computors (the Dominion Bureau of Statistics and the Research Staff of the Royal Commission) emphasize that their estimates are preliminary only and may be subject to considerable corrections. Furthermore, it is an established fact that a number of duplications are unavoidable in the computation of the gross product and some sources even question the reliability of gross national income figures. Kuznets, for example, emphasizes that duplications are most extensive in the computation of the gross national product.(1) The Dominion Bureau of Statistics emphasizes that "for purposes of ordinary economic discussion, the net figure should be used in preference to the gross, in view of the large amount of duplication which the latter includes." (2)

A satisfactory computation of the gross value of construction is available in the Construction Census though it only covers a part of the field of construction, shown as circle 1,a in Figure I. To make a useful comparison of the gross national income and gross value of construction, an attempt to estimate the total gross value of all construction work done in Canada has to be undertaken. Calculations to this effect have been made in this study in Section IV. These calculations are of importance not only for the purpose of comparison with the gross national income but also for that of giving us a rough estimate of what part of construction activity in Canada is covered by the Construction Census and what part is not.

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(1) Simon Kuznets, assisted by Lillian Epstein and Elizabeth Jenks: "National Income and Its Composition 1919 - 1938", New York 1941, Vol. I, p. 38.

(2) Dominion Bureau of Statistics: "Survey of Production in Canada, 1939", Ottawa, 1941, p. 27.

It is endeavoured in this study to give some rough indication of the importance of building and construction in relation to the Canadian economy by using the following methods:

1. A comparison of two net national income estimates (Dominion Bureau of Statistics and Research Staff of the Royal Commission) with the net income originating in construction as computed by the Dominion Bureau of Statistics. This comparison deals only with the field described by the Dominion Bureau of Statistics as "industrial construction" and is shown as circle 1,a in Figure I. This comparison does not include other construction work shown as circles 1, b-g in Figure I.

2. An analysis of two national income estimates and the total value of construction as reported in the Construction Census. A comparison of net national income estimates with a figure representing gross value might quite rightly be questioned; nevertheless this analysis may supply us with some useful information, especially when we consider that these figures are more reliable than most of the other estimates available. This analysis will be used to indicate the relative degree of change from year to year of national income and construction values.

3. A comparison of total wages and salaries paid to persons employed in the construction industry (shown as circle 1,a in Figure I) and in the industries supplying and transporting construction materials (shown as circle 2 in Figure I) with the total of all wages and salaries paid in Canada (shown as circle 8 in Figure I).

4. A comparison of the total "gross revenue" with the gross revenue resulting in construction. A definition of gross revenue will be found later on in this section. The Business Statistics Branch of the Dominion Bureau of Statistics, which is engaged in the computation of the national income, has been kind enough to give the writer access to the working sheets of their national income study. In 1941 a national income study was completed by the Dominion Bureau of Statistics entitled "National Income of Canada 1919 - 1938", Part I. A revision of the national income estimates contained in this study is presently being undertaken. The working sheets referring to the study completed in 1941 are called throughout this report "preliminary working sheets" while the working sheets referring to the revised estimates undertaken by the Dominion Bureau of Statistics are called "revised working sheets". The Business Statistics Branch was kind enough to prepare for this study a number of tables as per September 1942 providing the writer with the latest available estimates which have a bearing on the topic of this report. These tables are partly reproduced in the text and are partly shown in Appendix II.

5. A comparison of the gross national income with the gross value of all construction work done in Canada. In order to be able to use this method, an estimate of the gross value of all building and construction work done in Canada had to be made. This analysis is presented separately in Section IV.

National Income

Before discussing the contribution of building and construction to the Canadian economy, the term "National Income" has to be defined and a short description of Canadian national income estimates has to be given. Unless the reader knows what is meant under the phrase "national income" and what different methods are used to estimate the national income in Canada, it will be difficult to understand why a comparison of income originating in construction with the different national income estimates available show different results.

The national income is a most comprehensive measure of the economic welfare of a nation. It is the sum total of all the economic activity within a country. A knowledge of its magnitude and behaviour is of interest for this study because it will give us a basis for some quantitative idea of the effects which a reduction or an increase of construction activities in this country will have upon the total national income.

National income is described as the aggregate of all individual incomes earned in the production of goods and services. Kuznets in his book "National Income and Its Composition, 1919 - 1938" defines the national income as "the net value of all economic goods produced by the nation. Each term in this definition - 'net value', 'economic goods', 'produced', 'nation', --- is circumscribed by a wide area of reference accepted by common agreement and a substantial periphery subject to controversy and treated differently from time to time, country to country, and investigator to investigator."(1)

Following is a statement of the nature of national income from the standpoint of the statistical technique used in its compilation, the description also being in line with present-day economic theory.

"Year in, year out, the people of this country, assisted by the stock of goods in their possession, render a vast volume of work toward the satisfaction of their wants. Some of this work eventuates in commodities, such as coal, steel, clothing, furniture, automobiles; other takes the form of direct personal services, such as are rendered by physicians, lawyers, government officials, domestic servants, and the like. Both types of activity involve an effort on the part of an individual and an expenditure of some part of the country's stock of goods. If all commodities produced and all personal services rendered during the year are added at their market value, and from the resulting total we subtract the value of that part of the nation's stock of goods which was expended (both as raw materials and as capital equipment) in producing this total, then the remainder constitutes the net product of the national economy during the year. It is referred to as a national income produced, and may be defined briefly as that part of the economy's end-product which is attributable to the efforts of the individuals who comprise a nation."(2)

There are three computors of national income in Canada: (1) The Dominion Bureau of Statistics; (2) The Research Staff of the Royal Commission on Dominion Provincial Relations; (3) The Bank of Nova Scotia. Neither the methods used nor the results arrived at by these computors are exactly the same.

Dominion Bureau of Statistics - Estimate

The approach of the Dominion Bureau of Statistics to the measuring of national income is described in the following way.

The statistical measurement of the national income is a matter of great difficulty, and the most unremitting research into all the relevant statistics, in order to establish a representative figure, must always leave an appreciable margin of error. Indeed, it is no easy matter even for an individual to establish an accurate money figure as representing his total income, especially where he has to include in that total income, besides his cash income, an allowance for the rental value of his (owned) house and his durable belongings therein, together with an allowance for the money value of the commodities produced and consumed within the household (such as eggs and garden produce), and of the services, ordinarily bought and sold but rendered gratis within the family circle. Yet this is the only logical way of obtaining the total income of the family. While such income, not received directly in money, but in commodities produced and services rendered, is not, except for house and furniture rent, an important percentage of the family income in most urban families, it constitutes a very important part of the income of most rural families, who, to a much larger extent, consume the commodities which they themselves produce. For this reason, indeed, comparisons between the incomes of urban families and rural families are often misleading, through not allowing for the non-money income of the latter. Certainly most people never think of their non-money income as income at all, and would never consider putting the rental value of their owned homes into their income tax returns. Indeed, the income tax authorities of Canada do not expect them to do so.

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(1) Ibid., Vol. I. p.3.

(2) United States Department of Commerce: "National Income 1929 - 1935", Washington.

Difficulties experienced in expressing the total income of an individual as a single figure are multiplied a thousand-fold in any attempt to express the total of the national income as a single figure. The individual and corporate incomes which are to be combined into this grand total without duplication are of such a heterogeneous character that any figure which may be given as the grand total of the national income must include some margin of error.

The computation of the national income involves research by two different avenues of approach.

(1) Statistical data on an annual basis are collected by the Bureau of Statistics for most of the groups engaged in commodity production, trade and leading branches of transportation. The "gross revenue" received by each of these groups is taken as the starting point.(1) The cost of raw materials, process supplies, fuel and purchased electricity is the first deduction.(2) It is necessary also to subtract the miscellaneous expenses including rent, insurance, taxes, etc. The collection of miscellaneous expenses by the census of industry was discontinued after 1921, but the relationships established in the first three years of the post-war period are proving valuable as a basis of estimate. A special questionnaire has also been distributed to obtain a sample of miscellaneous expenses for the years 1929, 1933, and 1936.

Having deducted the miscellaneous expenses, the residue may be called the 'gross national product'. The next step is to estimate depreciation and depletion as a percentage of the fixed capital employed by the several groups. The gross national product less depreciation and depletion is regarded as the national income. It is not feasible to apply this treatment to all industrial groups of the Bureau's classification, but a growing proportion of the field is amenable to the method. Under the heading of real estate in the finance group, an estimate of the imputed rent of owned houses is included. The international balance of dividend and long-term interest payments is also deducted as a final adjustment.

(2) A second approach is by a summation of payments made to individuals. The normal source of information for this method is the tabulation of income tax returns. Such information forms the basis of the excellent estimates of national income prepared for the United Kingdom and the United States. However, the considerable expense involved in tabulation has militated against such elaborately detailed presentation of this material in Canada.

The census of industry furnishes data of the amount of salaries and wages paid, and wage data for decennial census years are available through the population census for each of the main industrial groups. The indexes of wage rates published by the Department of Labour and the monthly survey of employment conducted by the Bureau, are useful in estimating earnings for the intercensal years where specific information is not otherwise available. The numbers of persons working on own account and for employers, as reported by the decennial census, is valuable for estimating the withdrawals of entrepreneurs. Volumes X and XI of the Census Reports present pertinent data regarding wholesale and retail trade and a portion of the service field.

A sample of dividend and bond interest payments may be compiled from an examination of company accounts. The net amount of dividends paid by privately-owned companies as well as by corporations with public investment interest is also available. It is possible to estimate from census data the total amount of net rentals paid on dwellings. The contribution of government to the national income consists of the net interest paid on the funded debt and the salaries and wages, service and social pensions, compensation payments, and relief.

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(1) For an explanation of the computation of "gross revenue" in construction see Appendix II.

(2) The figure thus derived is called by the Dominion Bureau of Statistics "value added".

The aggregate paid to individuals is adjusted for business gains or losses. The latter signify the additions to or deductions from surplus by business concerns. After making the adjustment, the result is an estimate of the national income which should conform closely to the total prepared by the alternate production method.

The Bureau's present solution is to make two independent estimates of the national income for each year. One estimate is derived from a study of the separate industrial fields in which the income originates, the second is mainly an aggregate of incomes received by individuals with an adjustment for business gains or losses.(1)

Royal Commission on Dominion-Provincial Relations - Estimate(2)

The national income study prepared by the Research Staff of the Royal Commission on Dominion Provincial Relations represents in large part a different approach to the problem of computing the national income. For the purposes of the Royal Commission it was desirable to improve the accuracy of the estimates of the Dominion Bureau of Statistics, which in the opinion of the Research Staff contained a number of duplications chiefly due to inadequate allowances for expenses, and to give a breakdown of the national income by provinces. For the purpose of obtaining estimates of the total income received by the residents of each province and to avoid duplications, the "income paid out" and, in some cases, the "income received" method was adopted. The last estimates were published by the Research Staff in January, 1941. A revision of their estimates has been undertaken since. The Research Staff has kindly given the writer access to their latest estimates per July, 1942, thus enabling the writer to give a more accurate picture. It must, however, be emphasized that even these revised estimates are tentative only. There may be a further revision.

Bank of Nova Scotia - Estimate

The national income estimates made by the Bank of Nova Scotia are based on the "national income produced" method. That means that the Bank of Nova Scotia attempts to measure the total net value of production of all industries, including those providing services as well as those producing goods. Since all of the income arising from Canadian production is not currently available in Canada - some of it is paid to foreign investors and only partly offset by receipts of income from abroad and some of it is required to cover depreciation - an adjusted figure known as "available national income" has been calculated by the Bank of Nova Scotia. This estimate, which is smaller than the unadjusted figure of income produced, is used by the Bank of Nova Scotia for the purpose of covering the national income. The Bank of Nova Scotia comments on its own estimates that "these figures of available national income may be somewhat too large."(3)

To give an approximate picture of the difference of the three national income estimates the figures are compiled in Table I, shown on the following page. Data used in this table are preliminary figures and their sources are given

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(1) The Dominion Bureau of Statistics: "National Income of Canada 1919-1938", Ottawa 1941, and Canada Year Book, 1938, pp.889 - 891.

(2) D.C. MacGregor, J.B. Rutherford, G.E. Britnell, J.J. Deutsch, Research Staff of the Royal Commission on Dominion Provincial Relations (Rowell-Sirois Commission): "National Income", Appendix 4, Ottawa, 1939, and "National Income 1937-1940", Ottawa, January 1941.

(3) The Bank of Nova Scotia: "Monthly Review", Toronto, September 1940, Vol.XIV, Number 9. See also the "Monthly Review" of November 1935, December 1935, May 1937 and July 1938.

TABLE I.

Comparison of Three Estimates of
the National Income of Canada
1919 - 1940.

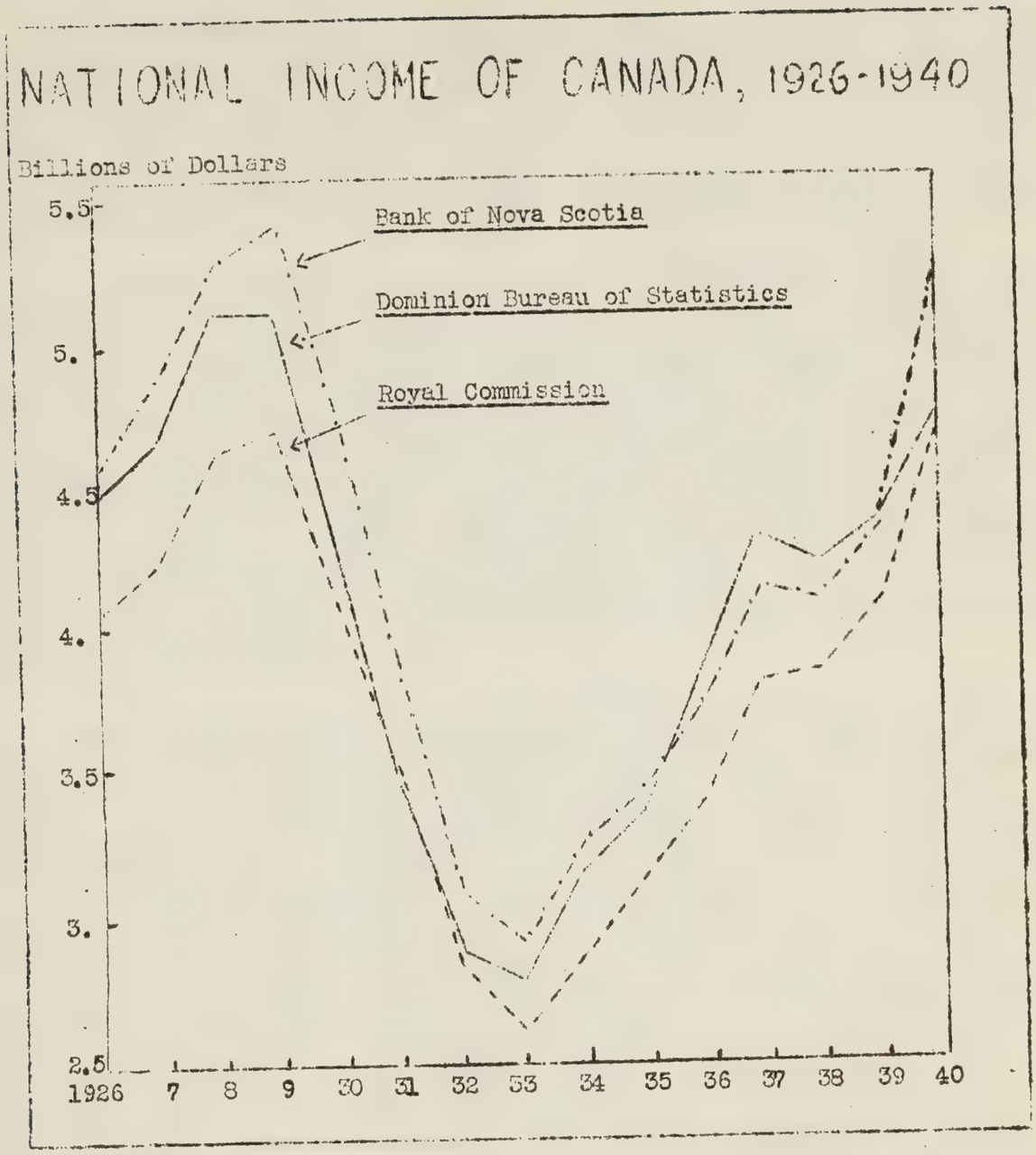
Year	Dominion Bureau of Statistics.(1) Million Dollars	Royal Commission (2) Million Dollars	Bank of Nova Scotia.(3) Million Dollars
1919	4,087	-	-
1920	4,614	-	-
1921	3,735	-	3,789
1922	3,762	-	3,809
1923	3,945	-	3,979
1924	3,854	-	3,975
1925	4,161	-	4,273
1926	4,494	4,081	4,564
1927	4,682	4,246	4,894
1928	5,138	4,641	5,308
1929	5,149	4,719	5,429
1930	4,326	4,168	4,771
1931	3,498	3,525	3,860
1932	2,893	2,862	3,109
1933	2,795	2,632	2,942
1934	3,171	2,879	3,278
1935	3,381	3,117	3,464
1936	3,829	3,417	3,759
1937	4,342	3,829	4,162
1938	4,246	3,880	4,132
1939	4,409	4,110	4,376
1940	4,784	4,740	5,230

(1) National income 1919 - 1938 published in a report entitled "National Income of Canada 1919 - 1938" (Part I) by the Dominion Bureau of Statistics in 1941. The figures given for 1939 and 1940 were estimates published in the Canada Year Book of 1940 and 1941 respectively. The Dominion Bureau of Statistics is undertaking a revision of their national income estimates. The revised estimates will be published probably in the spring of 1943. Tentative revised estimates are already available. The figures up to 1937 differ from the figures available in the report published in 1941 only to a very small extent. Estimates for 1938 to 1940 differ approximately 1% for 1938, approximately 8% for 1939, and approximately 12% for 1940.

(2) "Income Paid Out" 1926 to 1937, taken from Appendix IV, Table I, of "National Income", a study prepared for the Royal Commission on Dominion-Provincial Relations published in 1939. The figures for 1938-1940 have been supplied by the Research Department of the Bank of Canada. A revision of their national income estimates is being prepared.

(3) "Available National Income" 1921-1939 taken from the "Monthly Review of the Bank of Nova Scotia", May 1937 and September 1940. The figure for 1940 represents only a preliminary estimate and has not been published yet by the Bank of Nova Scotia. A revision of this national income estimate is being undertaken by the Bank of Nova Scotia. The revised figures for 1938 and 1939 are 4,133 and 4,445 million dollars respectively.

FIGURE II.



Comparison of the Estimates of National Income made by the Dominion Bureau of Statistics, the Research Staff of the Royal Commission on Dominion-Provincial Relations, and the Bank of Nova Scotia.

Dominion Bureau of Statistics: "National Income" computed by a combination of the "Income Produced" and the "Income Paid Out" methods.

Royal Commission: "National Income Paid Out" computed by the "Income Paid Out" method.

Bank of Nova Scotia: "National Income Available" computed by the "Income Produced" method.

in footnotes. An illustration of this table is given in Figure II. It is important to bear in mind that the figures contained in Table I are preliminary figures only and that the revised estimate presently undertaken by the Dominion Bureau of Statistics and the Research Staff of the Royal Commission will change the picture given in Figure II.

The comment made by the Research Staff of the Royal Commission on the differences between the three estimates explained that the differences are mainly due to "the known duplications in the Dominion Bureau of Statistics and the Bank of Nova Scotia estimates. On the other hand the estimates of the research staff of the Commission are probably on the low side, although by a much smaller and relatively unimportant net amount, on account of omissions. The omissions are chiefly in the estimates of investment income, income from odd jobs and the income of miscellaneous workers on their own account".(1)

A margin of error must be allowed in the computation of the national income, chiefly because of incomplete statistical coverage. Constituents of income are not all measurable and the available statistical information of income is not adequate to supply all data required for a national income study. Both estimates made by the Dominion Bureau of Statistics and Research Staff of the Royal Commission have their particular advantages. The Dominion Bureau of Statistics covers in greater detail the productive sources of the national income by distinguishing three economic divisions (commodity producing, commodity handling, and facilitating) and fourteen major groups (agriculture, forestry, fisheries and trapping, mining, manufactures, n.e.s., construction, custom and repair, transportation, communications, trade, finance, government, service, excluding custom and repair). The estimate made by the Research Staff of the Royal Commission supplies useful information with regard to a provincial breakdown of the national income.(2)

In conclusion, it may be said that Table I and Figure II show only in a rough way the different results which the national income estimates undertaken by the Dominion Bureau of Statistics, the Research Staff of the Royal Commission and the Bank of Nova Scotia have produced. To obtain a more accurate picture it would be necessary to adjust the estimates made by the Research Staff of the Royal Commission for certain accruals of income which differ from the amounts actually paid out to individuals during the period in question. Detailed information to this effect is not available and it is for this reason that the above comparison will have to suffice to show the difference of the three national income estimates. It is interesting to note that Figure II shows that, on the whole, the national income estimates made by the Dominion Bureau of Statistics and the Research Staff of the Royal Commission follow a similar trend. For several years of the period analyzed, the difference between the two estimates is without appreciable variation. This fact may allow us to infer that the different result obtained by both computors is due to a more or less constant factor. Figures III, IV and V bring out similar results. Even if both estimates have their particular advantages, it appears that a unified method of computing the Canadian national income would be highly desirable. A similar opinion is expressed by the Dominion Bureau of Statistics which states: "It is regrettable that no unanimity has been achieved as the content of the national income, definitions tending to centre around the production of goods and services and income payments to individuals".(3)

Let us now consider the methods of measuring the importance of the construction industry in relation to the Canadian economy as indicated at the beginning of this section.

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(1) Research Staff of the Royal Commission on Dominion Provincial Relations: "National Income", Appendix 4, Ottawa, 1939, p.12.

(2) The recent national income estimate of the Dominion Bureau of Statistics includes a provincial breakdown of the national income.

(3) Dominion Bureau of Statistics: "National Income of Canada, 1919-1938", Part I, Ottawa 1941, p. 129.

1. Net Income in Construction and Net National Income

Table II on the following page and the chart (Figure III) following it give a comparison of income originating in construction with the national income estimates made by the Dominion Bureau of Statistics and the Research Staff of the Royal Commission for the period 1935-1939.(1) The figures indicating the national income as estimated by the Dominion Bureau of Statistics are the latest as per September 1942.

It has already been mentioned in Section II that the Construction Census was introduced by the Dominion Bureau of Statistics in 1934, but that it was not before 1935 that the basis of this Census was standardized. It has been found advisable, however, throughout this study to use for the purpose of analysis the five-year period 1936-1940. This period gives the latest picture of building and construction as reported by the Construction Census.(2) One exception, however, is made to this rule. For the purpose of comparing net national income and net income resulting in construction, the period 1935-1939 has been selected because there is no estimate of national income resulting in building and construction available for 1940. Such an estimate is not likely to be made, since the Dominion Bureau of Statistics has changed, in their revised estimate of the national income, the method of computation of income originating in construction. While in their preliminary estimates income resulting in construction done by private contractors and the public authorities (the Dominion Government, the Harbours Board, the Provincial governments and Municipalities) was considered, only construction done by private contractors was taken into account when compiling the revised estimates of income originating in building and construction. Income originating in building and construction undertaken by the public authorities directly was taken into account under the heading "Government", together with income originating out of all other activities of the Government. (See the preliminary and revised working sheets of the Dominion Bureau of Statistics in Appendix II).

Figures indicating national income paid out represent the estimates as per July 1942. Both estimates are subject to further revision. Income originating in construction refers to construction as reported in the Construction Census (shown as circle 1,a in Figure I). The sources of these statistics are given in footnote (3) of Table II.

Bearing the above qualifications in mind we are now able to arrive at the statistics which purport to show the relative contribution of construction proper to the Canadian economy. It will be noted that building and construction contributed to the national income, as estimated by the Dominion Bureau of Statistics, 3 percent in 1935, 3 percent in 1936, 3.5 percent in 1937, 3.6 percent in 1938 and 3.4 percent in 1939. The average contribution for this five-year period was 3.3 percent. The contribution of construction to the national income as estimated by the Royal Commission is somewhat higher, the average contribution for the five-year period being 3.6 percent.

At first sight this appears to be a very small contribution of the construction industry to the national income. However, we have to remember that no consideration has been given to the field of construction activity which is not covered by the Construction Census (shown as circles 1, b-g in Figure I), and that no consideration has been given to the national income originating in the construction material supplying and transporting industries.

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(1) Figure III shows also the contribution of wages and salaries paid in construction proper to the total of wages and salaries paid in Canada. For sources of statistics see Table VI and VII.

(2) Only a preliminary edition of the Construction Census for 1941 has been published. This edition deals only with construction work undertaken by private contractors. A report on construction work undertaken directly by the public authorities during 1941 has not been published yet.

TABLE II.

COMPARISON OF NATIONAL INCOME ORIGINATING IN CONSTRUCTION WITH TWO NATIONAL INCOME ESTIMATES

1935 - 1939

Year	National Income, Dominion Bureau of Statistics (1) Million Dollars	National Income Paid Out, Royal Commission Estimate (2) Million Dollars	National Income Originating in Construction (3) Million Dollars	Ratio of National Income Originating in Construction to National Income Estimates	
				(a) Dominion Bureau of Statistics Percent	(b) Royal Commission Percent
1935	3,363	3,117	102	3.0	3.3
1936	3,831	3,417	115	3.0	3.3
1937	4,346	3,829	152	3.5	3.9
1938	4,291	3,880	153	3.6	3.9
1939	4,559	4,110	159	3.4	3.8
Average ratio 1935 - 1939				3.3	3.6

(1) National income, revised figures for 1935-1939, supplied by the Dominion Bureau of Statistics as per September 1942. Since the revision of the National Income Estimate is not completed, there may be a further revision of these figures.

(2) Income paid out, figures for 1935-1937 taken from Appendix 4, Table I of "National Income", a study prepared for the Royal Commission on Dominion-Provincial Relations published in 1939. The figures for 1938 to 1939 have been supplied by the Research Staff of the Royal Commission. They represent the latest estimates as per July, 1942. There may be a further revision of these figures.

(3) Data for national income originating in construction taken from "Operating Accounts of the Construction Industry, 1919-1939" (preliminary sheet) supplied by the Business Statistics Branch of the Dominion Bureau of Statistics as per September, 1942. A revision of these figures, excluding construction work done by the Dominion Government, the Harbours Board, the Provincial Governments and the Municipalities, is being undertaken. (See Appendix II).

FIGURE III.

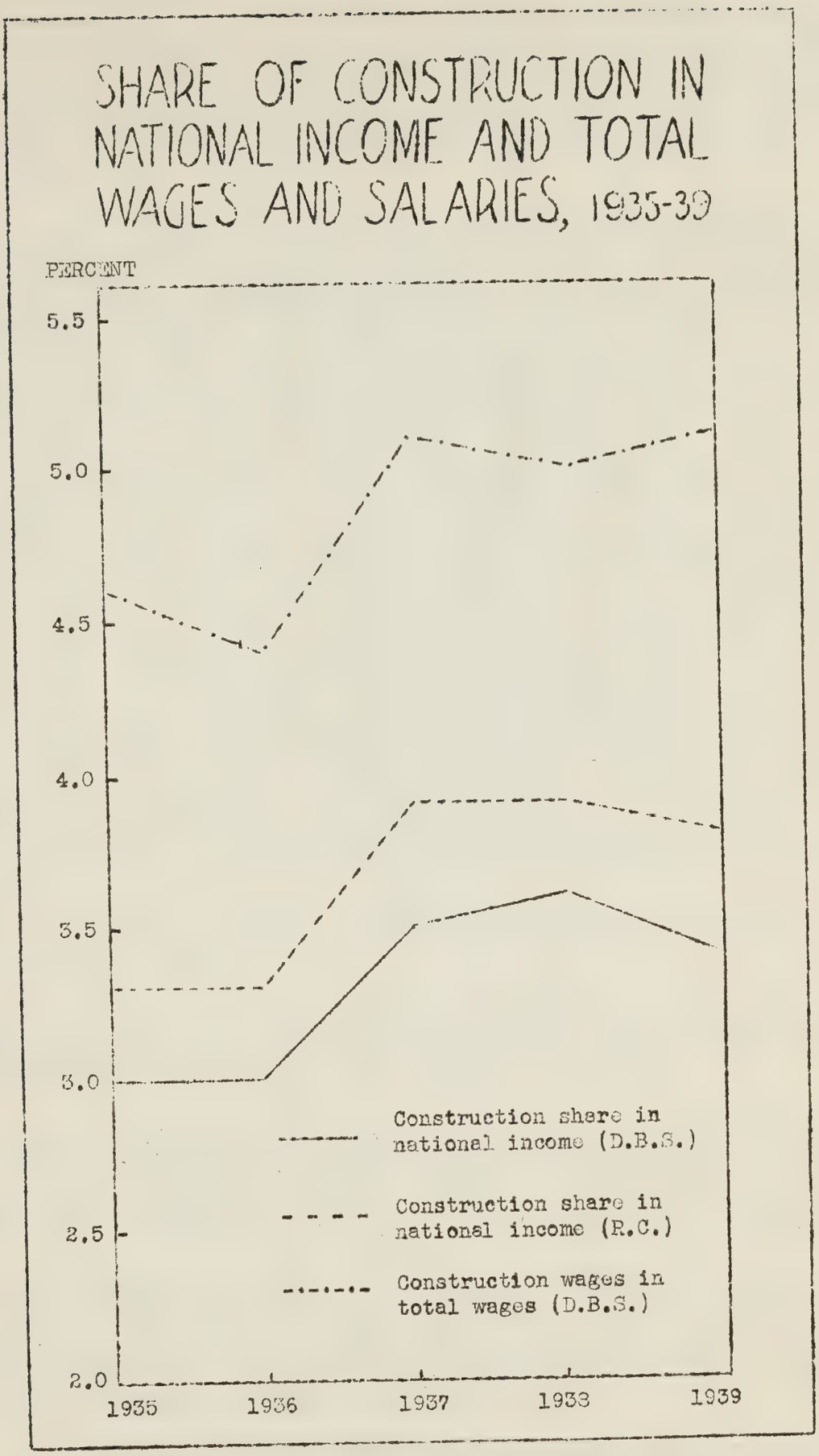

Chart showing the contribution of building and construction to the national income (Dominion Bureau of Statistics and Royal Commission - estimates) and the contribution of building and construction to the total wages and salaries paid during 1935 - 1939. See Table II for sources of statistics with reference to national income percentages and Tables VI and VII with reference to wages and salaries percentages.

2. Changes of National Income and Total Value of Reported Construction.

Bearing in mind what has been said about this analysis at the beginning of this section, let us now consider the changes of national income and of total value of construction during the period 1936 - 1940. The following tables show "Two National Income Estimates and Total Value of Construction" (Table III), "Annual Changes in National Income Estimates and Construction Values" (Table IV) and "Relative Increase and Decrease in National Income Estimates and Construction Values" (Table V).

It is of interest to note that, according to the estimate of the Dominion Bureau of Statistics, the national income increased considerably in 1936 from its 1935 level ($468,000,000) and again in 1937 in proportion to the 1936 level ($515,000,000) the national income decreased during 1938 ($55,000,000), and increased somewhat in 1939 ($268,000,000) and considerably in 1940 ($807,000,000). The yearly average of increase of the national income for the period of 1936 - 1940 amounted to $397,000,000. The annual changes in national income as estimated by the Research Staff of the Royal Commission differ to some extent, the yearly average of increase amounting to $211,000,000 for the period under review. Table IV shows also the actual increase from year to year of total value of construction. The lowest increase was in 1938, when the total value of construction was only approximately $1,000,000 higher than in the year previous, and the greatest increase is to be found during 1940, when it amounted to $101,000,000. Table V shows the relative degree of change from year to year of national income and construction value.(1) It shows most markedly that the increase or decrease of th total value of construction took place at a much more rapid pace than the increase or decrease of total national income. This volatility or susceptibility to economic change of the construction industry is of prime importance because it offers an explanation for the marked fluctuations of the volume of building and construction during the "between the two wars period", 1919-1938. This fact of great fluctuations in building and construction as compared with other industries or the total economic activity of the country is clearly recognizable from a number of charts which are included in this study. (See Figures V, XIII, XV, XVI, and XVII). In this connection it might also be said that cyclical variations of the construction industry are almost invariably greater than those of any other industry.

The Dominion Bureau of Statistics comments on the marked fluctuations of the construction industry, in a memorandum to which the writer was kindly given access, as follows:

"Shifts in population and associated developments also constitute a major influence. As buildings are immobile and durable, a migration geographically is as important as in increase in the total.

"Increased construction programmes are normally bound up with increased productivity in other branches of industry and with trends in family life and expenditures which are made possible by larger incomes. Increased savings permit enlarged construction activity to meet increased demand and at the same time stimulate construction projects as profitable investments.

"Construction is the most conspicuous example of an industry carried on in almost complete dependence on local demand. The building industry is not only the most widespread in its operations but it is also one which expands most rapidly in prosperous times when it attracts great numbers of general and casual workmen - a characteristic which explains the high rate of unemployment from which the industry periodically suffers.

"The industries supplying raw material such as lumber, steel, cement, paint, glass and hardware are prosperous when the construction industry is

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(1) This relative degree of change from year to year is sometimes called "link relatives". These relatives are expressed in percentages by using the year previous as base for the computation of the increase or decrease of the following year.

TABLE III

Two National Income Estimates and Total Value of Reported Construction
1936 - 1940

Year	National Income Dominion Bureau of Statistics. (1) Million Dollars	National Income Paid Out - Royal Commission Estimate (2) Million Dollars	Total Value of construction (3) Million Dollars
1936	3,831	3,417	258
1937	4,346	3,829	352
1938	4,291	3,880	353
1939	4,559	4,110	373
1940	5,366	4,740	474
Average 1936-40	4,479	3,995	362

(1) National Income, revised figures for 1936-1940, supplied by the Dominion Bureau of Statistics as per September 1942. Since the revision of the national income estimate is not completed, there may be a further revision of this figure.

(2) Income Paid Out, figures for 1936 - 1937 taken from Appendix IV, Table I of "National Income" a study prepared for the Royal Commission on Dominion-Provincial Relations published in 1939. The figures for 1938 to 1940 have been supplied by the Research Staff of the Royal Commission of Dominion-Provincial Relations. They represent the latest estimates as per July, 1942. There may be a further revision of these figures.

(3) Total Value of Construction, 1936 - 1940, taken from the annual "Report on the Construction Industry in Canada" 1936 - 1940 published by the Dominion Bureau of Statistics in 1938 - 1942.

FIGURE IV.

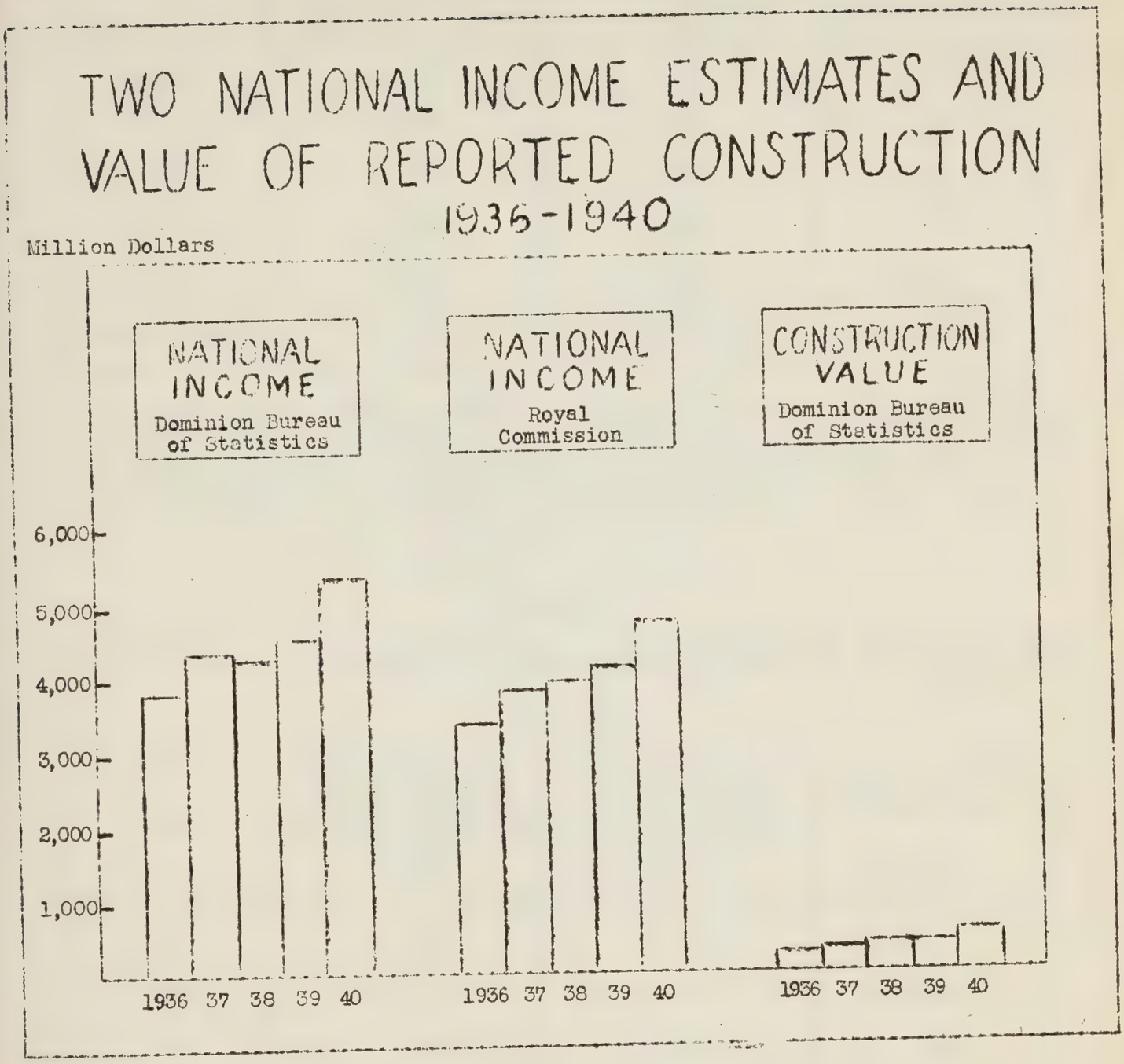

Chart showing the variation in National Income estimates and total value of reported construction. For sources of statistics see previous table.

TABLE IV

ANNUAL CHANGES IN NATIONAL INCOME ESTIMATES AND CONSTRUCTION VALUES

1936 - 1940

Year	National Income Dominion Bureau of Statistics Estimate Million Dollars	National Income Paid Out Royal Commission Estimate Million Dollars	Total Value of Construction Million Dollars
1936	+ 450	+ 300	+- 43
1937	+ 515	+ 412	+ 94
1938	- 55	+ 51	+ 1
1939	+ 268	+ 230	+ 20
1940	+ 807	+ 63	+ 101
Yearly Average	+ 397	+ 211	+ 52

Table showing actual increase or decrease, from year to year, of National Income Estimates by the Dominion Bureau of Statistics, and the Royal Commission on Dominion-Provincial Relations, and total values of construction as reported by the Construction Census published by the Dominion Bureau of Statistics. An increase is shown by +, a decrease is shown by -.

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TABLE V

RELATIVE INCREASE AND DECREASE IN NATIONAL INCOME ESTIMATES AND CONSTRUCTION VALUES

1936 - 1940

Year	National Income Dominion Bureau of Statistics Estimate Percent	National Income Paid Out Royal Commission Estimate Percent	Total Value of Construction Percent
1936	+ 13.3	+ 9.62	+ 20.
1937	+ 13.44	+ 12.05	+ 36.43
1938	- 1.26	+ 1.33	+ 0.28
1939	+ 6.24	+ 5.92	+ 5.66
1940	+ 17.7	+ 15.32	+ 27.07
Yearly Average	+ 9.88	+ 8.85	+ 17.89

Table showing relative degree of change, from year to year, of National Estimates by the Dominion Bureau of Statistics, and the Royal Commission on Dominion Provincial Relations, and total values of construction as reported by the Construction Census published by the Dominion Bureau of Statistics. An increase is shown by +, a decrease is shown by -.

FIGURE V.

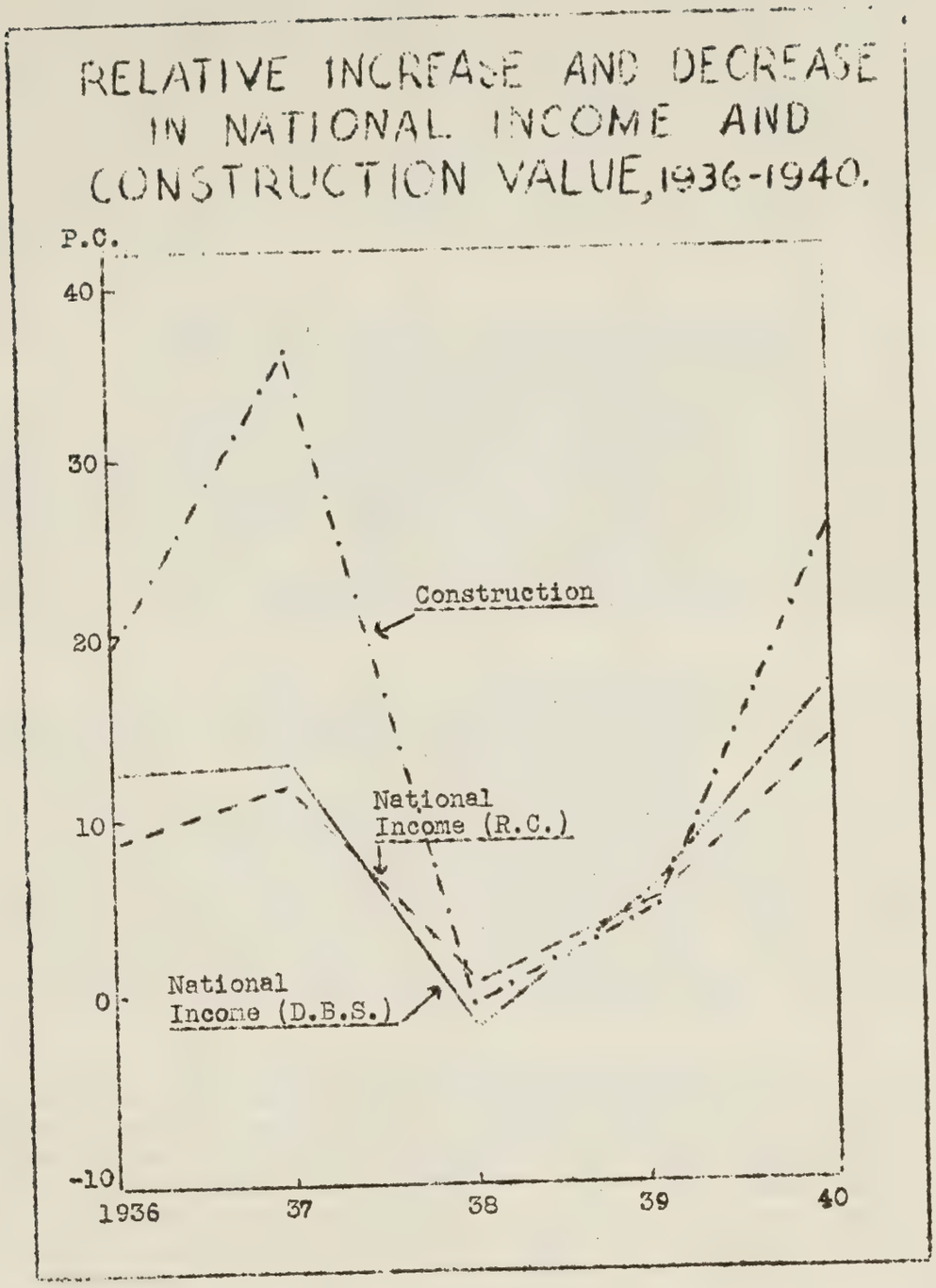

Chart showing relative degree of change, from year to year, of National Income Estimates by the Dominion Bureau of Statistics and the Research Staff of the Royal Commission on Dominion Provincial Relations, and total values of construction as reported by the Construction Census published by the Dominion Bureau of Statistics.

active and depressed when it is at a standstill. Current conditions in the construction industry react powerfully upon the whole economic life of the nation."

The marked fluctuations of building and construction are more clearly recognizable if we consider a longer period than analyzed in this section. In Section VII a comparison of the total national income with income originating in building and construction for Canada and the United States during 1929-1938 is made. Table XXIII, XXIV and XXV and Figures XVIII and XIX show clearly, for this major phase of the business cycle, the different course which building and construction took as compared with the national income. The marked fluctuations of the construction industry are also emphasized in Section VI in which construction is compared with other industries in Canada.

3. Wages and Salaries in Building and Construction compared with Total of Wages and Salaries.

It is intended to compare in the following, for the period 1936 to 1940, the total wages and salaries paid in construction industry, including the construction material supplying and transporting industries, as reported in the Construction Census (shown as circle 1,a and circle 2 in Figure I), with the total salaries and wages paid to all persons employed in Canada (shown as circle 8 in Figure I), using the latest estimates made available, as per September 1942, by the Business Statistics Branch of the Dominion Bureau of Statistics.

Persons earning a salary or wage in Canada are classified by the Population Census of the Dominion Bureau of Statistics as "wage-earners". The term "wage-earner", as used in the census, means a person who works for a salary or wage irrespective of the nature of his employment. "Earnings" includes moneys received by way of commission or piece rate payment in addition to salary or wage, but does not include income from investment, pension or compensation. Hence such gainfully occupied persons as "employers", who employ others in the conduct of their own business, or "own account workers", who practise their trade or profession unassisted, or "unpaid family workers", who are employed without pay on work which contributes to the family income, as do many farmers' sons, were not included in the census inquiry on earnings.(1)

It is, therefore, important to bear in mind that the following comparison shows only what part of the total wages and salaries paid to all persons employed in Canada (shown as circle 8 in Figure I) is due to the activities of the construction industry and the industries supplying and transporting construction materials as reported in the Construction Census (shown as circles 1,a and 2 in Figure I). Wages and salaries paid to persons not reported in the Construction Census (shown as circles 1, b - g in Figure I) are not considered.

There are two difficulties to be overcome before we are able to compare like with like. Firstly, the figures contained in the Construction Census indicating the total of wages and salaries have to be adapted for our purpose because the withdrawals of working proprietors are included under the heading "salaries and wages". Working proprietors, however, do not fall under the definition of "wage-earners" and their withdrawals have, therefore, to be segregated from the wages and salaries paid to persons employed in the construction industry.

The Dominion Bureau of Statistics has used an ingenious method of segregating withdrawals of working proprietors from the salaries and wages paid in construction work undertaken by general and trade contractors and

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(1) Census of Canada, 1931, Vol. V, p.XV.

sub-contractors. This method is described more in detail in Appendix II. Table VI, which will be found on the following page, gives in column "B" the salaries and wages of persons employed with private contractors for the period 1936 to 1940 as computed by the Business Statistics Branch. In addition to the work undertaken by private contractors there was construction work done directly by the public authorities (Dominion Government, the Harbours Board, the Provincial Governments and Municipalities). In these cases the public authorities acted mainly as direct employers without using private contractors as intermediaries. The Construction Census reports salaries and wages paid by the public authorities to persons employed on construction work. The respective figures are given in column "C" of Table VI. The total of wages and salaries paid to all persons engaged in construction industry as reported by the Construction Census is shown in column "D" of Table VI. Wages and salaries amounted to 95 million dollars in 1936, gradually rising to 148 millions in 1940.

The second difficulty is the fact that there are no wages and salaries reported for the construction material supplying and transporting industries. We know the total of wages and salaries paid in the manufacturing industries, for example, the steel industry, and in the transportation industries, for example, the railways, but we do not know what share of the total wages and salaries paid is due to the production and transportation of construction material.

Pending a more detailed study of the problem we will have to rely, therefore, on an estimate which the writer has undertaken. A canvass has been made to determine the approximate ratio of wages and salaries to the total value of construction material used in the construction industry as reported by the Construction Census. The Canadian Construction Association was kind enough to draw the attention of the writer to the fact that a number of contractors have undertaken studies and estimates of the labour contents of construction projects which they have carried out. These studies contained useful information as to a breakdown of man-hours spent on the production and transportation of construction material and gave also the approximate total of wages and salaries paid to persons employed in the production and transportation of the construction material used. The result of the survey showed that most of the contractors were in agreement that 80 percent to 90 percent of the total amount expended for construction materials was spent on wages and salaries. The contractors based their reports on either actual studies which they had undertaken in the past or on estimates which they had made with the assistance of manufacturers supplying construction materials. In other words, according to calculations and estimates made by the Canadian contractors, 80 percent to 90 percent of the value of construction material goes into wages and salaries if the total labour contents of the finished product is considered from the raw material producing industry to the manufacturer producing the finished goods.

The construction industry claims that these estimates are supported by a statement contained in a brief which the Conference of "all national organizations interested in the construction industry" put before the Prime Minister, Honourable R. B. Bennett, in February 1933. This Conference emphasized the importance of the construction industry for the Canadian economy by declaring that it has been proved "beyond doubt that for every dollar spent in the construction industry, eighty-two cents finds its way into pay envelopes, either directly on the construction job, or indirectly in the factories manufacturing construction materials and the transportation companies which carry them to the works. Only the balance of eighteen cents represents the true material costs and the cost of financing other overhead".(1)

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(1) "Conference of all national organizations interested in the construction industry", Toronto, February 1933: Brief to the Honourable R.B. Bennett, Prime Minister of Canada; p.3.

TABLE VI

COMPARISON OF WAGES AND SALARIES PAID TO PERSONS EMPLOYED IN THE CONSTRUCTION INDUSTRY AND THE CONSTRUCTION MATERIAL SUPPLYING AND TRANSPORTING INDUSTRIES WITH THE WAGES AND SALARIES PAID TO ALL PERSONS EMPLOYED IN CANADA.

1936 - 1940

A	B	C	D	E	F	G	H
Year	Salaries and Wages of Persons Employed with Private Contractors (1)	Salaries and Wages of Persons Employed on Construction Work for the Dominion Government, the Harbours Board, the Provincial Governments and the Municipalities (2)	Total of Wages and Salaries Paid to Persons Engaged in Construction Industry (B + C)	Estimated Wages and Salaries of Persons Employed in the Construction Material Supplying and Transporting Industries (3)	Total of D and E	Total Wages and Salaries paid to all Persons Employed in Canada (1)	Ratio of F to G.
	Million Dollars	Million Dollars	Million Dollars	Million Dollars	Million Dollars	Million Dollars	Percent
1936	57	38	95	92	187	2,143	8.7
1937	81	43	124	132	256	2,414	10.6
1938	81	41	122	133	255	2,436	10.5
1939	79	50	129	142	271	2,517	10.8
1940	99	49	148	200	348	2,860	12.2
						Average Ratio 1936 - 1939	10.6

(1) Data supplied by the Business Statistics Branch of the Dominion Bureau of Statistics as per September, 1942.

(2) Data taken from the reports on the construction industry in Canada 1936 - 1940.

(3) Estimate based upon the statistics for cost of material used in the construction industry in the reports on the construction industry in Canada 1936 - 1940. It has been assumed that 75 percent of the cost of material represents wages and salaries.

FIGURE VI.

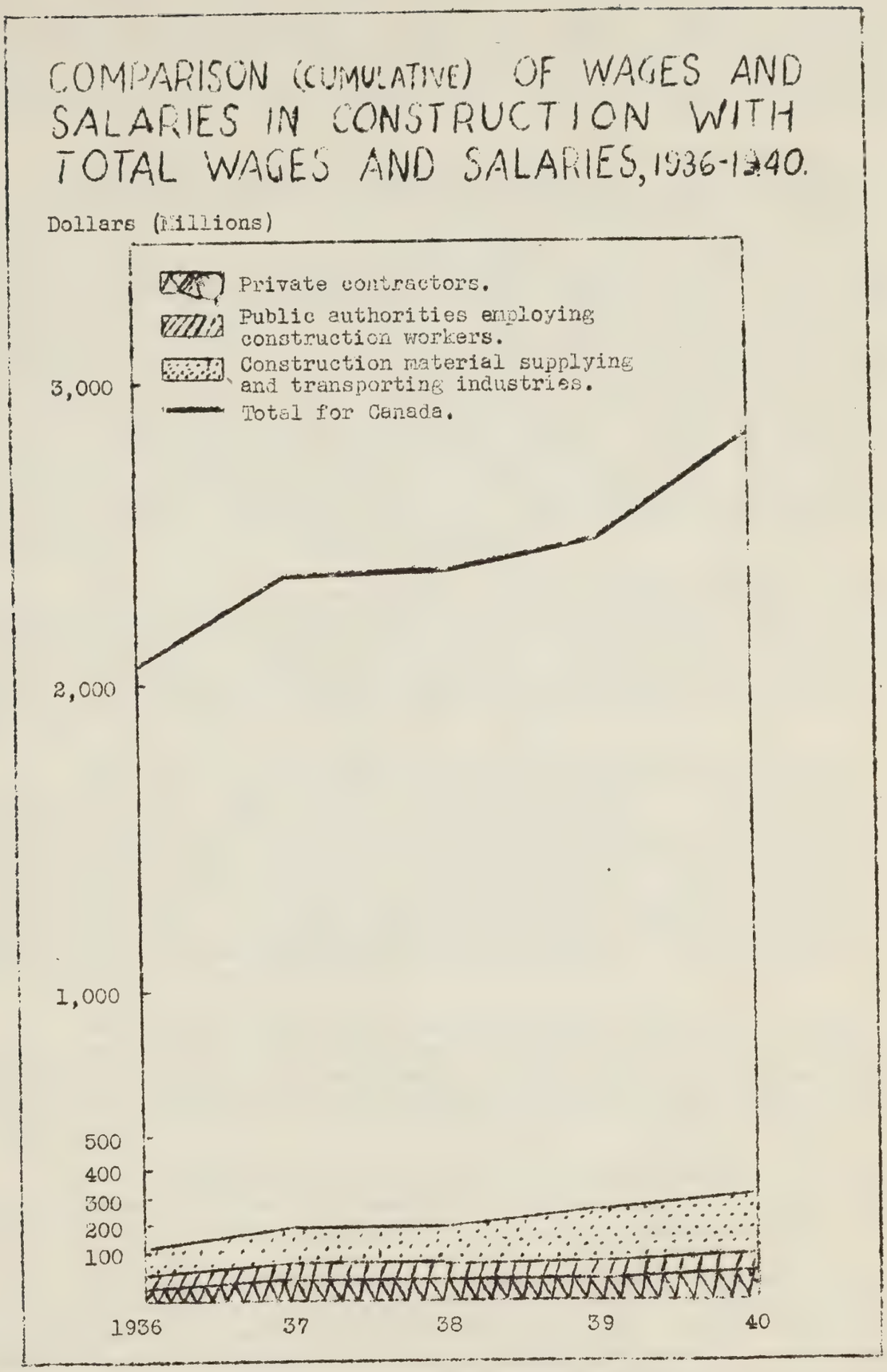

Chart showing a comparison (cumulative) of wages and salaries paid to persons employed in the construction industry and the construction material supplying and transporting industries with the wages and salaries paid to all persons employed in Canada, 1936-1940. For sources of statistics see table on previous page.

For the purpose of this study it has been assumed that 75 percent of the costs of all the materials used, represent the total of salaries and wages paid in the construction material supplying and transporting industries. It must be emphasized that this assumption will be approximately correct only for some industries producing construction material. In other industries this percentage might be too large, while in others it might be too low. It is clear that the labour contents of finished goods varies. However, the above assumed ratio is only intended to serve as an average ratio covering all industries supplying and transporting construction material.

The importance of undertaking a study of the labour contents in construction material used on construction jobs is discussed in Section V. Here it may only be said that the Bureau of Labour Statistics of the United States Department of Labour has compiled statistics indicating the labour value of a number of finished and half finished products used by the construction industry. As a check, for the above assumed ratio of 75 percent, the writer has undertaken an analysis of some of the calculations which the Bureau of Labour Statistics in Washington has made with regard to the labour contents and labour value of houses built under the Public Works Administration. Approximately 42 million dollars of construction material used for building purposes was subjected to the analysis and it was found that, as an average, the ratio of 75 percent was approximately correct. It must, however, again be emphasized that even this check of a fairly comprehensive sample does not allow us to conclude that the ratio of 75 percent will apply to every individual industry producing construction material. The range of ratio between the various industries might be quite extensive.

The total of wages and salaries paid to persons employed in the construction material supplying and transporting industries, calculated on the assumption that 75 percent of the cost of material used represents wages and salaries, are shown in column "E" of Table VI. Column "F" shows the total of wages and salaries paid to persons employed in the construction industry including the construction supplying and transporting industries.

The Business Statistics Branch supplied the estimates as per September 1942 with regard to the total wages and salaries paid to all persons employed in Canada. These figures are shown in column "G" of Table VI. Column "H" shows what proportion of the total wages and salaries paid in Canada was due to the activity of the construction industry and the construction material supplying and transporting industries as reported in the Construction Census. The contribution was lowest in 1936 at 8.7 percent and highest in 1940 at 12.2 percent. The average yearly contribution for the period 1936 to 1940 was 10.6 percent.

The Figure V following Table VI shows in a cumulative way the share of wages and salaries paid by the construction industry (private contractors, public authorities employing construction workers, and by the construction material supplying and transporting industries) as compared with the total of wages and salaries paid to all employed in Canada during 1936 to 1940.

In the following the results of the comparison of the net national income with the net income originating in construction(1) are brought into proper relation with the method used in the above mentioned analysis.

For the purpose of comparing the two different studies, we have to restrict our estimate in this section to the activity of "construction proper" and eliminate the estimated contributions of wages and salaries paid in the construction material supplying and transporting industries which have been included in our estimate in order to give a complete picture of all wages and salaries paid in construction industry.(2)

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(1) See Subsection I : "Net Income in Construction and Net National Income".

(2) The term construction industry is used here in its extensive sense as defined in Section II.

Table VII, shown on the following page, gives for the period 1935-1939 the contributions of income originating in construction to the national income as estimated by the Dominion Bureau of Statistics, and by the Research Staff of the Royal Commission, and indicates also what part of the total salaries and wages paid in Canada is contributed by payments of wages and salaries in building and construction proper. The variations between the three different average ratios of 3.3 percent, 3.6 percent and 4.8 percent for the period 1935-1939 show us the possible range of contributions of building and construction proper to the Canadian economy.

4. Gross Revenue in Construction and Total Gross Revenue.

The Business Statistics Branch of the Dominion Bureau of Statistics has suggested that some useful information could be obtained from a comparison of the gross revenue in construction with the total gross revenue and has kindly prepared for this report the statistics contained in Table IX which shows the "relative importance of construction as a segment of Canadian enterprise, 1934-1940".

The Business Statistics Branch also gave the writer access to their working sheets on the gross national income, especially their compilations of gross revenue in construction. The statistics contained in Table VIII showing "gross revenue in construction industry, 1919-1940" represent a summary of the data contained in the working sheets. The description of method of computation of gross revenue in construction for the period 1919-1940 and the statistics contained in the working sheets will be found in Appendix II. Here it need only be said that the Dominion Bureau of Statistics made two computations of the gross revenue of construction: (a) the preliminary computation which deals with the total "gross revenue" resulting from construction work done by private contractors and the public authorities, and (b) a revised computation which refers to construction work done by private contractors only.

Before analyzing the findings contained in the above two tables an explanation of the term "gross revenue" is desirable.

The Dominion Bureau of Statistics uses the term gross revenue for the purpose of indicating the most extensive form of the gross national income, which is a form of national income distinctly different to what has been described in the beginning of this section as the net national income. Kuznets comments on the importance of distinguishing between net and gross national income by saying:

"We have defined national income as the net value of all goods produced by the nation during a given time unit. The emphasis on net and the need of distinguishing between gross and net values become clear from two observations. First, national income measures the results of economic activity cumulated over a finite period, rather than the state of the economic system at any one time. Second, the production of economic goods, both within separate enterprises and for the economic system as a whole, involves the use and consumption of already existing goods, products of time units preceding the one whose products are being measured or of this time unit itself. Since the full value of any good includes the value of other goods absorbed in its production, it would not do to count in national income the full value of A as well as the value of B consumed in the process of producing A.

"The distinction between gross and net is clearest in the case of a single enterprise. In performing its productive functions during a given period, an enterprise almost inevitably consumes products of past periods and of other enterprises. Its specific contribution to the value of goods made available during the current period for purposes of consumption and addition to stock is the value of its products over and above the value of products of past periods and of other enterprises consumed in the production process. Thus the net value of the enterprise's product is the full or gross value minus the value consumed by it, i.e., the cost of commodities and of

TABLE VII

COMPARISON OF THE CONTRIBUTION OF BUILDING AND CONSTRUCTION PROPER TO THE NATIONAL INCOME AND THE TOTAL WAGES AND SALARIES.

1935 - 1939

Year	Ratio of National Income Originating in Construction to National Income Estimates(1)		Ratio of Wages and Salaries Paid in Building and Construction Proper to Total of Salaries and Wages Paid(2)
	(a) Dominion Bureau of Statistics	(b) Royal Commission	
	Percent	Percent	Percent
1935	3.0	3.3	4.6
1936	3.0	3.3	4.4
1937	3.5	3.9	5.1
1938	3.6	3.9	5.0
1939	3.4	3.8	5.1
Average ratios 1935-1939	3.3	3.6	4.8

(1) For sources of statistics see Table II.

(2) Data for 1936-1939 taken from Table VI. The ratio is established by a comparison of the figures shown in column D with those in column G. The total of wages and salaries paid to persons in building and construction proper for 1935 is computed in the same method as used in Table VI. Data are partly supplied by the Business Statistics Branch of the Dominion Bureau of Statistics and partly taken from the Report on the Construction Industry in Canada 1935.

services of other enterprises used up in the production process. The factors in a given enterprise that give rise to the excess of the gross value of product over the value of products consumed can be identified: they are labour, services of managerial and entrepreneurial personnel and of capital. The net value of product is thus the value of production specifically attributable to labor, capital, and entrepreneurial ability engaged in the enterprise.

"This description can be extended to the national economy as a whole. The sum of the net values of products turned out by the enterprises that comprise the economic system is the net total that constitutes national income; and the sum of the full values of products of the various enterprises yields a gross national product total. The difference between national income and this gross national product is the value of products of enterprises consumed in the productive activity of all enterprises that comprise the national economy. In other words, net national product or national income is the value of product specifically attributable to labor, capital, and entrepreneurial ability."(1)

The range of definitions of the gross national income by different computors varies just like the methods used for computing the gross national income differ.

The Dominion Bureau of Statistics calls gross national income, in its most extensive sense, "gross revenue". The following stages are observed in proceeding from gross revenue to net national income: "Gross Revenue" minus "Cost of material, fuel and electricity" gives "Value added". Thereafter "General Expenses" (excluding wages, interest and profits) are deducted and the result is "Gross National Product". From the Gross National Product "Depreciation" is deducted giving the "National Income" (net national income).

The Research Staff of the Royal Commission on Dominion-Provincial Relations speaks of "gross national product at market prices" in reference to the gross national income. The following stages are observed: To "Total national income paid out including military pay" (net national income) is added "Undistributed profits before deducting depletion" and an "inventory revaluation adjustment". The result is called "Net national income produced at factor cost". To this is added "Indirect taxes and revenues ex personal taxes", giving the so-called "Net national income produced at market prices". The aggregate of this "Net national income produced at market prices" and "Current allowances for depreciation" results in the "Gross national product at market prices". It is quite clear from this breakdown that "Gross national product at market prices" as computed by the Research Staff of the Royal Commission on Dominion-Provincial Relations is something entirely different from "gross revenue" as computed by the Dominion Bureau of Statistics. It might be said that in a rough way the "Gross national product at market prices" could be compared with the estimates made by the Dominion Bureau of Statistics under the heading "value added", since in both cases estimates contained under the headings described are arrived at by giving consideration to (a) net national income, (b) allowances for depreciation, and (c) general expenses (including indirect taxes).

Returning now to an examination of gross value of construction or "gross revenue" as shown in Table VIII on the following page, we find that we are now in the position to analyse and to present graphically the fluctuations which construction activity in this country underwent during the period 1919-1940. Hitherto, the statistics referring to "value of contracts awarded" as reported in MacLean's Building Reports were used for this purpose. This method has two distinct disadvantages as compared with the method used in this study.

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(1) Simon Kuznets, assisted by Lillian Epstein and Elizabeth Jenks: "National Income and Its Composition, 1919-1938", New York 1941, Vol. I, pp. 34, 35.

TABLE VIII

GROSS REVENUE IN CONSTRUCTION INDUSTRY

1919 - 1940

A	B	C	D
Year	Construction Work Done by Private Contractors and the Public Authorities (Preliminary Estimate)(1) Million Dollars	Construction Work Done by Private Contractors only (Revised Estimate) (2) Million Dollars	Construction Work Done by the Public Authorities only (B - C)(3) Million Dollars
1919	327	238	89
1920	444	355	89
1921	367	278	89
1922	384	295	89
1923	397	308	89
1924	385	296	89
1925	405	316	89
1926	452	363	89
1927	510	421	89
1928	578	489	89
1929	591	502	89
1930	539	450	89
1931	391	302	89
1932	271	133	138
1933	208	97	111
1934	177	99	78
1935	216	148	68
1936	258	197	61
1937	352	278	74
1938	353	281	72
1939	373	287	86
1940	474	380	94

(1) Data supplied by the Business Statistics Branch of the Dominion Bureau of Statistics. Statistics are taken from the Preliminary Working Sheet which the Dominion Bureau of Statistics used for their national income estimate. For details and the method of computation see Appendix II.

(2) Data supplied by the Business Statistics Branch of the Dominion Bureau of Statistics. Statistics are taken from the Revised Working Sheet which the Dominion Bureau of Statistics used for their national income estimate. For details and the method of computation see Appendix II.

(3) The figures for 1919 to 1933 are based on assumptions made by the Dominion Bureau of Statistics. The figures for 1934 to 1940 are taken from the Construction Census for these years.

1. "Contracts awarded" do not include construction work undertaken by the public authorities directly. The Construction Census provides statistics for this type of construction work from 1934 onwards. Estimates of construction work done directly by the public authorities for the period 1919 to 1933 have been made by the Dominion Bureau of Statistics and private sources.

2. Contracts awarded during one year are not necessarily carried out in the same year, while in other cases some contracts awarded extend for more than one year. The values given under the heading "Construction Contracts Awarded" refer to work actually in sight. These figures are related to the figures of work performed during the year only so far as the work thus provided for is completed and duly reported in the Census of Construction prepared by the Dominion Bureau of Statistics. Values of contracts awarded, especially those referring to building, are estimates - or "under-estimates" as it is explained by the Dominion Bureau of Statistics(1) - of work to be done. It is clear that "contracts awarded" figures do not show the actual volume of construction undertaken during one year, which is exactly the thing we want to know when we speak of yearly fluctuations in the size of the construction industry.

The Dominion Bureau of Statistics has assumed, in its preliminary estimate of gross revenue, that the public authorities spent an average of $89,000,000 per year for the period 1919 to 1931, $138,000,000 in 1932 and $111,000,000 in 1933, and has added these figures to the estimates of gross value of construction work done by private contractors in order to obtain the total gross revenue of construction. Since there was no assurance that the above assumptions gave an accurate picture of the situation, the Dominion Bureau of Statistics, in its revised estimate, left out the construction work undertaken by the Dominion Government, the Harbours Board, the Provincial Governments and the Municipalities when computing the gross revenue resulting from construction activities. This construction work undertaken by the public authorities was treated as a part of governmental operations.

In this connection it is of interest to examine the estimates made by the Dominion Bureau of Statistics in the light of calculations of the size of "private" and "public" construction made by W.D. Black, the President of the Otis-Fensom Elevator Company, Limited, for the period 1919-1933.(2)

Mr. Black distinguished between "private construction", the data for which he secured from "contracts awarded" statistics contained in the MacLean's Building Reports, and "public construction" for which he made an estimate himself. Mr. Black included under the heading of public construction the "total value of all Dominion, Provincial, Municipal and Railway construction".(3)

Two charts, one showing public and private construction and the other illustrating the share of railway construction in public construction, are included in Mr. Black's study entitled "Construction, the Joint in the Armour of Depression", The information gathered for the purpose of Mr. Black's publication was unfortunately disposed of, but Mr. Black was helpful in providing the writer with the following statement as to the method and accuracy of his estimate of public construction:

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(1) Canada Year Book, 1941, p. 371.

(2) W.D. Black: "Construction, the Joint in the Armour of Depression", the text of an address delivered to the annual convention of the Canadian Construction Association, January 1934.

(3) Ibid. p. 15.

"The most difficult figures to obtain were those concerning public works, in which case I was obliged to have one of our representatives in each of the Provinces make a search of the Provincial records of construction. There were some gaps in these records and a diversity in the form of presenting them and in this case a certain amount of pro-rating was necessary although sufficient information was obtainable in all cases to indicate the general trend from year to year. The figures for railway construction were obtained from the two major companies."

Figure VII, to be found on the following page, gives a graphic representation of

1. gross value of construction work done by private contractors and the public authorities (shown as a full line), estimate made by the Dominion Bureau of Statistics;

2. gross value of construction work done by private contractors only (shown as a line broken by dashes and dots), estimate made by the Dominion Bureau of Statistics;

3. gross value of public and private construction based on estimates made by W. D. Black (shown as a broken line), and

4. the aggregate of gross value of construction work done by private contractors, as estimated by the Dominion Bureau of Statistics, and construction work done by the public authorities excluding railway construction, as estimated by W. D. Black (shown as dotted line).

It appeared for reasons explained above that the combination of "contracts awarded" method (private construction) and "yearly volume" method (public construction) used by Mr. Black would not give a very accurate picture of the fluctuations in the yearly volume of construction activities. However, Mr. Black's estimate of construction work undertaken directly by the public authorities during 1919 to 1933 are, after the value of railway construction has been deducted, of great value for the purpose of comparison with the average figures assumed by the Dominion Bureau of Statistics to represent the construction work undertaken by the Dominion Government, the Harbours Board, the Provincial Governments and the Municipalities.

If we compare the curve drawn as a dotted line, in Figure VII (Dominion Bureau of Statistics' estimate) with the curve broken by dashes and dots (combination of estimates made by Dominion Bureau of Statistics and Mr. Black), then we find great similarity in the design of both curves. Only for the period 1932-1934 is an appreciable difference noticeable. This similarity of the two curves allows us to infer either (a) that the assumption made by the Dominion Bureau of Statistics is a very good appraisal of the situation, or - what is less probable - (b) that there is a remarkable coincidence of two estimates which have been made by two entirely different computors.

When summarizing the results of Table VIII and Figure VII, the following picture of the fluctuations of construction gross value is represented for the period 1919-1940.

The gross value of construction amounted to $327,000,000 in 1919, rose to $444,000,000 in 1920, and declined somewhat in the following years for a short post-war depression period. Not before 1924 is there a definite upward trend noticeable which continues thereafter until 1929 when the gross value of construction amounted to $591,000,000. From 1930 onwards a rapid decline is noticable due to the depression in the early thirties, the lowest point being reached with $177,000,000 in 1934. From 1935 recovery is clearly recognizable, though it is interrupted during 1938 when there was practically

FIGURE VII.

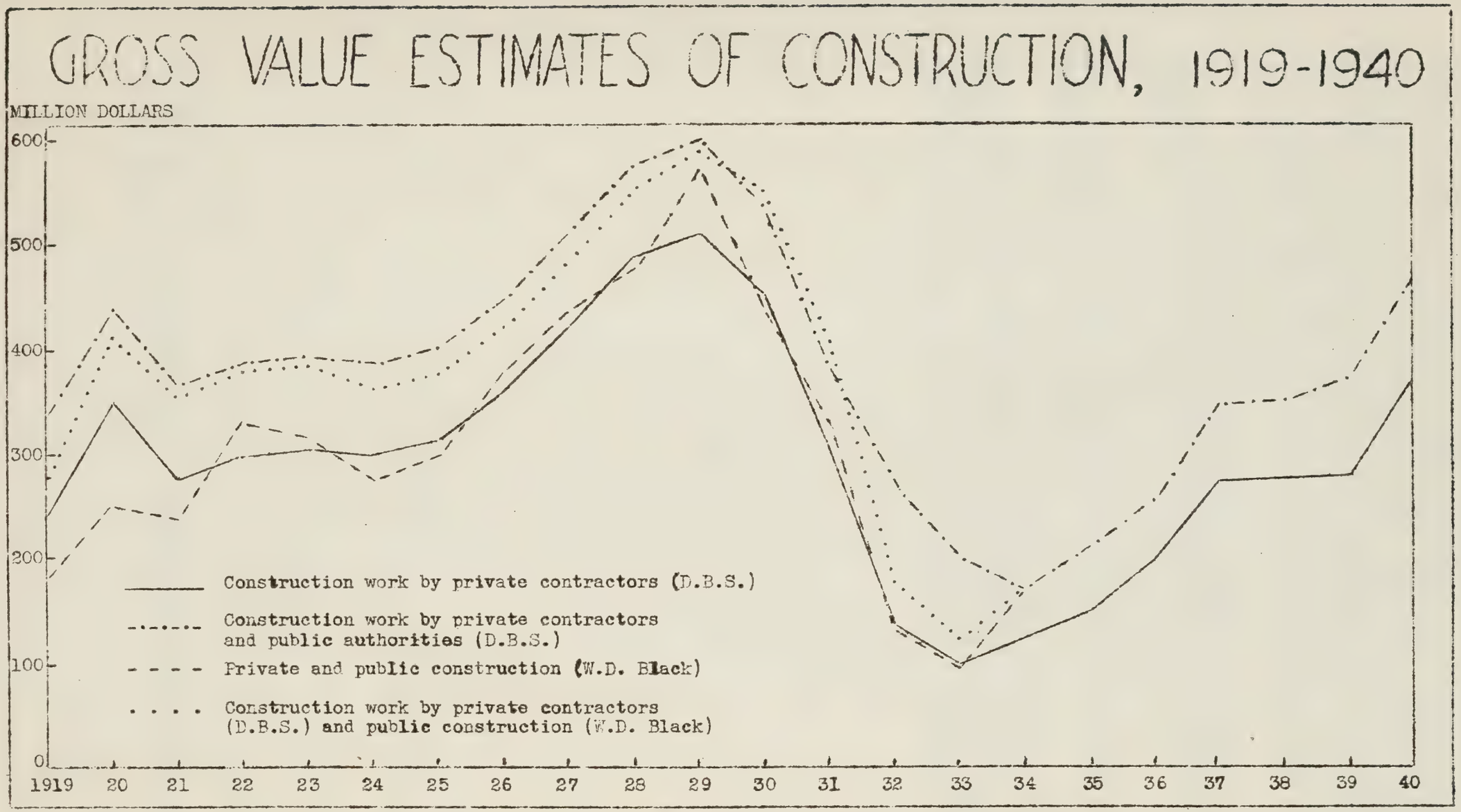

Chart shows: (a) for the period 1919-1940, gross value of construction work done by private contractors and the public authorities (preliminary estimate) and of construction work done by private contractors only (revised estimate), both estimates from Dominion Bureau of Statistics and (b) for the period 1919-1933, gross value of public and private construction based on estimates made by W.D. Black and on a combination of construction work done by private contractors (Dominion Bureau of Statistics - estimate) and construction work done by the public authorities excluding railway construction. (W.D. Black - estimate.)

no increase of construction activity. We thus have been able to obtain a fairly accurate picture of the construction cycle for a period of more than two decades.(1)

Table IX, at the end of this section, gives a comparison of gross revenue in construction with the total gross revenue as computed by the Dominion Bureau of Statistics, for the period 1934-1940. Construction refers to the activity of private contractors only. Not considered is construction work undertaken directly by the public authorities. The contribution of construction to total gross revenue expressed in percentages varies between 0.83 percent in 1934 and 1.98 percent in 1940. The average ratio for 1934-1940 is 1.6 percent and for 1936-1940 is 1.84 percent. The low percentage will be no surprise if the following qualifications, repeatedly stressed throughout this section, are borne in mind:

(1) "Gross revenue of construction" refers only to construction work done by general and trade contractors and sub-contractors. This construction work is only a part of building and construction as shown in circle 1,a of Figure I.

(2) Total "gross revenue" refers to gross national income in its most extensive form. It is the aggregate of net national income, depreciation, general expenses, and cost of materials.

In conclusion it may be said that the completion of the present national income study undertaken by the Dominion-Bureau of Statistics will supply useful information with regard to the importance of construction industry in relation to other Canadian enterprises, although this study covers under the heading "construction" only one segment of the construction industry.

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(1) This method of presentation could be improved by considering the changing value of the Canadian dollar.

TABLE IX

THE RELATIVE IMPORTANCE OF CONSTRUCTION AS A SEGMENT OF CANADIAN ENTERPRISE.(1)

1934 - 1940

Year	Gross Revenue in Construction (2) Million Dollars	Total Gross Revenue (3) Million Dollars	Ratio Percent
1934	99	11,449	0.86
1935	148	12,049	1.23
1936	197	13,334	1.48
1937	278	15,067	1.84
1938	281	14,345	1.96
1939	287	14,979	1.92
1940	346	17,445	1.98
		Average 1934-1940	1.61
		Average 1936-1940	1.84

(1) Estimates supplied by the Business Statistics Branch of the Dominion Bureau of Statistics as per September 1942. The estimates are subject to revision.

(2) The term construction is used in this connection to indicate the construction work done by general and trade contractors and subcontractors. This is only a part of what has been shown as circle 1, a in Figure I.

(3) Total gross revenue is the sum of net national income, depreciation, general expenses and cost of materials.

SECTION IV

ESTIMATE OF THE GROSS VALUE OF ALL CONSTRUCTION ACTIVITY IN CANADA AND A COMPARISON WITH THE GROSS NATIONAL INCOME.

It has been explained in Section III that the methods of comparison used there, refer only to the field of construction work as reported by the Construction Census.

It is endeavoured in this section to supplement the analysis made in the previous section by estimating the gross value of all construction work in Canada during 1940 and by comparing the result with the gross national income as estimated by the Research Staff of the Royal Commission on Dominion-Provincial Relations. Though the latter estimates are tentative only and subject to further revision, comparison of these estimates with the estimates of gross value of all construction done in Canada may give some indication of the importance of building and construction in relation to the Canadian economy.

It has been explained in Section II that the Construction Census published annually by the Dominion Bureau of Statistics reports only a proportion of all construction work done in Canada. This proportion of construction work reported by the Dominion Bureau of Statistics has been shown in Figure I as circle 1 a. It has further been pointed out that there were a number of persons engaged in construction work not reported by the Construction Census. This type of work was classified and shown by circles 1 b - g. It is this part of construction activity in Canada which the following estimate intends to cover.

The estimate of the gross value of construction not reported by the Dominion Bureau of Statistics is based partly on an analysis which Professor D.C. MacGregor undertook in an article entitled "Gross and Net Investment in Canada - Tentative Estimates".(1)

Professor D.C. MacGregor and Dr. L.C. Marsh were kind enough to assist the writer in this analysis. Their suggestions and comments are partly embodied in the text and partly referred to in footnotes.

MacGregor's Estimate of Construction Work on Rural and Urban Dwellings.

Professor MacGregor, who was a member of the Research Staff of the Royal Commission on Dominion-Provincial Relations, had done considerable work on the National Income Study undertaken by the Commission. In the above-mentioned article Professor MacGregor endeavoured to estimate the gross value of construction work done in Canada for the year 1930, basing his calculations upon the 1934 Census of Construction published by the Dominion Bureau of Statistics.

Professor MacGregor, however, realized that the estimate thus derived was not satisfactory because of the incomplete statistical coverage of certain construction work done in Canada which has been shown as circles 1, b - g in Figure I. Therefore, he went into the question of estimating construction work done on all farm buildings, on dwellings other than farms and

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(1) D.C. MacGregor: "Gross and Net Investment in Canada - Tentative Estimates", an article published in "The Canadian Journal of Economics and Political Science", Toronto, February 1941, Vol. VII, No.1, pp. 39 ff.

on stores and other buildings which was not reported by the Construction Census, and suggested a round figure of $100,000,000 for 1930 and $73,000,000 for 1937. These two estimates would cover that type of construction work which has been shown as circles l, f and g in Figure I.

Professor MacGregor justified his assumptions by a piece of excellent analytical work. He found that there was only about $11,000,000, reported by the Construction Census under the heading of "Trade construction", of work done by "general and trade contractors" in 1934. He commented on these statistics: "It should be noted that not all of the eleven millions of work reported above under trade construction in 1934 was for repairs and alterations upon dwellings and farms. Perhaps no more than two-thirds or one-half of it relates to farm buildings and non-farm dwellings. In contrast with the amounts indicated for 1934 in the above table, the research staff of the Rowell-Sirois Commission estimated that annual depreciation on farm buildings was approximately $50 million in 1934 (National Income, Ottawa, 1939, p. 161) while the depreciation on non-farm dwellings in the same year is estimated herein by the writer at roughly $80 million.

"It may therefore be concluded either (a) that only about 10 per cent of the estimated annual consumption of capital in farm buildings and non-farm dwellings was made good by repairs and alterations during 1934, or (b) that the Census of Construction understates the value of work done on the multitude of small jobs devoted to the maintenance of this type of capital. Conclusion (a) is in part supported by two considerations: first, by the common knowledge that during the depression a great deal of maintenance work of a permanent character was postponed, and second, by the possibility that capital consumption in this field is offset mainly by erection of entirely new structures rather than by upkeep of old ones. With respect to the first consideration, comparable figures of alterations and repairs for relatively prosperous years give totals not much larger than in 1934; in 1938, for example, the total of column two of the previous table shows that the comparable total was only $35.4 million. This amount falls far short of covering the estimated current consumption of capital, to say nothing of the large accumulation of deferred maintenance work, some of which was doubtless made good in 1938. As to the second consideration, the comparatively small total in the Maclean record of contracts for residential construction, which averaged only $40 million per year for the period 1932-8, together with the tangible evidence that household (and to a lesser extent, farm) properties have on the whole been reasonably well kept up since 1930, indicates that the aggregate investment must have been maintained for the most part by repair and maintenance rather than by new construction. We are therefore justified in rejecting conclusion (a) as highly unlikely and in regarding (b) as tenable.

"An arbitrary addition to the estimated value of construction is thus justified."(1)

Following Professor MacGregor's suggestion we will be justified in assuming that approximately $73,000,000 has been spent on construction work (repairs and alterations) on farm buildings, on dwellings other than farms and on stores and other buildings. The gross value of work recorded by the 1937 Census of Construction was $352,000,000. We thus find that 20.73 per cent of the total construction value for 1937 represented the share of construction work done on rural and urban dwellings. Professor MacGregor emphasizes that this estimate does not include "similar work done for own account by the construction staffs of manufacturers, public utilities, railways, mines, or other private enterprises other than farms".

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(1) Ibid. pp. 55 - 56.

Other Construction Work not Reported by the Dominion Bureau of Statistics, 1940.

To estimate the gross value of construction activity in Canada we will, therefore, have to use the following components:

(1) Construction activity reported by the Construction Census of the Dominion Bureau of Statistics (shown as circle 1, a in Figure 1).

(2) Estimate of construction and maintenance work on rural and urban dwellings as estimated by D.C. MacGregor (shown as circles f and g in Figure 1).

(3) Other construction work not reported by the Dominion Bureau of Statistics (shown as circles b - e in Figure 1). The gross value of this type of work is discussed in the following paragraphs.

This estimate of construction work not reported by the Dominion Bureau of Statistics is based on the fact that the number of persons giving their occupations as "construction occupations" is considerably greater than the number of persons in construction occupations who were reported to be engaged in construction industry by the Construction Census.

National Registration, 1940.

It was reported in the National Registration, 1940, that approximately 192,000 persons gave their occupations as "building and construction". These persons were contractors and sub-contractors (owners and managers), foremen, overseers, and inspectors, and a variety of tradesmen and apprentices like brick and stone masons, carpenters, cement and concrete finishers, electricians and wiremen, painters, decorators, glaziers, plasterers and lathers, plumbers and steamfitters, roofers and slaters, structural metal workers (field), and other skilled construction workers. This group will henceforth be called "persons in construction occupations".

It is important to bear in mind that unskilled persons like men digging and hauling earth - sometimes called construction labourers - and semi-skilled persons such as helpers, are not included in the group of persons in construction occupations as classified in the National Registration, 1940. As explained later in this section allowance must be made for a margin of error in the computation of persons in construction occupations as enumerated in the National Registration, 1940, because it is quite possible that a number of helpers or other semi-skilled construction workers have been registered as fully skilled craftsmen.

The Construction Census for 1940 reports that, as a yearly average, there were approximately 124,000 wage-earning employees engaged in the construction industry. That means that there were working in the construction industry 124,000 wage-earners who were fully employed throughout the whole year of 1940. The figure of 124,000 gives us the full-time equivalent of all wage-earners employed in construction industry during 1940. If, for example, five different firms reported the employment of twelve men for one month each, the Construction Census will report one person employed fully throughout 1940. In the same way, days and weeks of employment are added up to obtain the average number of persons employed in the construction industry.

The figure of 124,000 includes unskilled workers doing construction work. It follows that ther were less than 124,000 tradesmen (skilled) doing construction work which was reported by the Construction Census. Even if we allow a certain percentage for seasonal unemployment of persons in construction occupations, we find that there is a great discrepancy between the number of persons reported to be in construction occupations by the National

Registration, 1940, and the persons engaged in construction industry as reported by the Construction Census. It is obvious that the construction craftsmen whose activities were not reported in the Construction Census were doing some kind of construction work. This group of people, not considered in the Construction Census, were not only doing construction work themselves but were also providing employment for salaried personnel and other unskilled workers assisting them in doing construction work. Furthermore, these persons were using construction materials. Their activity was also causing overhead expenses and providing profits, part of which were not distributed. Only if we are able to estimate the activity of these persons in construction occupations who are not reported in the Construction Census and add the result to the gross value of construction work reported by the Construction Census and the gross value of construction work done on rural and urban dwellings, will we be able to determine the total gross value of construction work done in Canada.

The National Registration in 1940 does not give us a complete picture of all persons engaged in "building and construction". The National Registration includes only persons of 16 to 69 years. However, there was a small group of apprentices of less than 16 years of age and a number of tradesmen over 69 years of age who were working in construction occupations during 1940. Furthermore, the compilation of "construction occupations", a phrase used to include contractors, foremen, draftsmen and apprentices only, was not as accurate as the computation usually undertaken in the Population Census. (1) It might well be, as explained by some of those who were engaged in examining the results of the National Registration, 1940, that some persons who were not skilled tradesmen registered as such, while other persons whose trade would have warranted their inclusion under the heading "building and construction" might have been registered under a different heading. It was further found practical when undertaking the National Registration in 1940 to include certain skilled tradesmen who were doing construction work, in a different category because their work was closely related to the type of industry in which they were working. So, for example, timber men and sump men who install sets of timbers to support walls of a shaft in a mine were included under the heading "mining, quarrying, oil and salt wells". It appears, however, to be advisable to classify for the purpose of this study a timber man or a sump man as a construction worker and not as a miner. If a timber man or sump man loses his job in the mine, he will most probably be qualified, because of his previous training, to take on a job with a building contractor to do rough carpentry work.

It is admitted that there are some border cases in which it is hard to tell whether a person should be classified under the heading "building and construction" or under a different heading indicating the type of work he is doing. Dr. L.C. Marsh was confronted with this difficulty when he discussed the range of the construction trade in his book "Canadians In and Out of Work". (2) He pointed, as an example, to the fact that there was "some overlapping between the building and steel trades". The best method to cope with this difficulty of border cases will probably be to determine whether the training and skill which a person has acquired would enable him to qualify as a tradesman under the heading "building and construction". In other words, a timber man or a sump man who can do carpentry work should be classified as a person falling under the heading "building and construction"; and a repairman who has been doing some repair work

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(1) Dr. L.C. Marsh comments that this is a very important consideration. It is reasonable to assume that the inaccuracy in the computation of the National Registration in 1940 was probably widest for construction occupations.

(2) Dr. L.C. Marsh: "Canadians In and Out of Work", a survey of economic classes and their relation to the labour market, Toronto, 1940, p.86.

in a mine, but who has not acquired any skill to warrant describing him as a craftsman, should be classified as an unskilled or semi-skilled worker falling under the heading "Mining".

Taking into consideration what has been said above, about the accuracy of the National Registration, it is suggested that the total reported on the National Registration be raised by the arbitrarily assumed figure of 8,000 to allow for persons not covered by the National Registration and a few specialized occupations which are not included under the heading "construction occupations". With this addition, we get a round figure of 200,000 persons in construction occupations in 1940. This total does not include men in the armed forces. The writer believes that this figure is a very conservative estimate and that it is quite likely that an analysis of the 1941 Census, when completed, will show an even higher figure than the one assumed above. Figures from the 1941 Census, however, will not be available until some time in 1943. In the meantime the assumed figure of 200,000 will have to suffice.

Unemployment of Persons in Construction Occupations.

We have now to consider that not all of these 200,000 persons in construction occupations were actively engaged in construction work throughout the year. It is known that there is seasonal unemployment in the construction field. We have to calculate, therefore, the "average unemployment ratio" of persons in construction occupations for 1940. The phrase "average unemployment ratio" is used here to mean a figure which indicates the number of unemployed in relation to the number of employable persons. It can mean also the time lost by one worker or a group of them in the course of a year for a number of reasons as mentioned further on in this study.

The Social Analysis Branch of the Dominion Bureau of Statistics has made estimates of employment of the wage-earning population. The method used can be briefly described as follows. A percentage employed from month to month is calculated on: (1) the Department of Labour's figures of unions, corrected for sample qualities; (2) employment figures, collected by the Bureau of Statistics, in relation to the total population normally gainfully occupied, this latter making allowance for the changing population content. The percentage is then applied to the census number of employed to calculate the number of wage-earners in any month. The difference between the wage-earners and the number employed is obviously the unemployed.(1)

The Dominion Bureau of Statistics estimated that 85.9 per cent were employed of the total number of wage-earners in Canada during 1939. Consequently there were, as an average, 14.1 per cent of all wage earners unemployed.(2) A further estimate has been made by the Dominion Bureau of Statistics for the first three months in 1940, the average ratio of unemployment for this period being 14.2 per cent. Owing to the changes and dislocation in industrial production caused by the demands of war, the above-mentioned computation has been discontinued.(3) The writer has undertaken an inquiry into the question of representative unemployment of construction workers. It appears that the average ratio of total time lost by construction workers is somewhat higher than the same ratio for all wage-earners. This is mainly due to weather conditions and to the marked fluctuations of construction activity.

According to information supplied by the Canadian Construction Association, unemployment in the construction industry due to weather conditions has decreased due to improved building methods and the comparatively mild winter

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(1) Canada Year Book, 1940, p.750.
(2) Canada Year Book, 1940, p.751.
(3) Canada Year Book, 1941, p.656.

weather in recent years. It appears, however, that the average unemployment ratio of construction workers is still somewhat higher than the average unemployment ratio of other wage-earners. An indication of this factor may be found in examining an example provided by employment figures of construction craftsmen in the trade unions.

There are available comparatively accurate reports of unemployment ratios of construction workers who are members of trade unions. The following table, (number X), gives the percentages of unemployment in building and construction trade unions throughout the year 1940.

TABLE X

PERCENTAGE OF UNEMPLOYMENT IN BUILDING AND CONSTRUCTION TRADE UNIONS FOR 1940. (1).

1940 Month	Unemployment Per Cent
January	35.60
February	38.20
March	36.50
April	30.20
May	19.90
June	13.50
July	11.90
August	11.10
September	7.10
October	9.90
November	11.60
December	15.60
Annual Average	20.09

This table shows in a most marked way the seasonal fluctuation of construction employment in trade unions. Unemployment in 1940 was highest in February when 38.2 per cent of the members of building and construction trade unions were unemployed, and lowest in September when only 7.1 percent were unemployed. The yearly average of unemployment in building and construction trade unions throughout 1940 was 20.09 per cent.

To indicate the size of the sample, it may be said that during

(1) Data taken from "Unemployment in Trade Unions at the close of December, 1940", an article published in the "Labour Gazette", Department of Labour, February, 1941, Vol.XLI, Number 2, p. 161.

December 1940, 232 reports were tabulated from unions of building tradesmen with a combined membership of 29,027. The chart on the following page (Figure VIII) illustrates the monthly changes of unemployment in construction and building trade unions during 1940 in percentage of those employed, the yearly average of unemployment and the assumed loss of time by all construction workers during the year.

The average unemployment ratio of 20.09 per cent will have to be revised for our purpose, since a survey undertaken by the writer indicated that unemployment among persons who were not members of trade unions was, on the whole, lower than unemployment among persons belonging to trade unions. The main reason is probably that persons not belonging to trade unions are willing to work for lower wages than prescribed by the unions and are, therefore, less out of work than members of trade unions. It has therefore been assumed that the average unemployment ratio for all persons in construction occupations is somewhat less than 20.09 per cent (unemployment ratio for members of building and trade unions) and somewhat higher than 14.1 per cent or 14.2 per cent (the average ratio of unemployment for 1939 and the first three months of 1940 for all wage-earners). A ratio of 17 per cent is suggested to indicate the time which persons in construction occupations lost during 1940. (1) In other words, it is assumed that out of 52 weeks persons in construction occupations were only working 83 per cent of the time or about 43 weeks and were laid off for 9 weeks. The method used here is similar to that adopted for the Population Census 1931 in which each wage-earner was asked to state the total number of weeks lost during the 12 months' period ended June 1st, 1931, owing to "no job", "temporary lay-off", "illness", "accident", "strike or lockout" and "other" cause. In arriving at the number of weeks employed during the 12 months ended June 1st, 1931, the total weeks lost over this period, as reported in the Census, was subtracted from 52 weeks.

For the purpose of this study, the number of persons in construction occupations who were working throughout the year is required. We realize that this group has not been fully occupied throughout 1940. They might have lost some time due to lack of employment or lay-off through ill-health, strikes, etc. If it be assumed, as has been explained above, that these persons in construction occupations have been working on an average only 43 weeks out of 52 weeks during 1940, it will be necessary to reduce the figure of 200,000 according to these findings in order to obtain the average number of persons in construction occupations who have been working without any loss of time during 1940. By doing so there is obtained a figure of 166,000 persons who were assumed to have been fully employed during 1940. These 166,000 persons represent the equivalent of full-time employment of the skilled construction labour force potential.

Construction Employment Reported in the Construction Census.

The Construction Census for 1940 reports that on an average there were about 124,000 wage-earning employees, comprising tradesmen, apprentices, semi-skilled men (helpers) and unskilled labourers. In addition, there were 25,810 salaried employees. The Construction Census includes general and trade contractors and sub-contractors under the heading "salaried employees". Our estimate would be more accurate if a breakdown of "salaried employees" were available showing the number of general and trade contractors, sub-contractors, managers, clerical staff and persons of "other professional occupations". Since the Construction Census includes owners and managers under the heading

(1) Examination of relevant statistics of the 1931 Census, carried out as a check, indicated that the above estimate is fully justifiable. See Table 16 of Census 1931, Vol.V, p.32.

FIGURE VIII

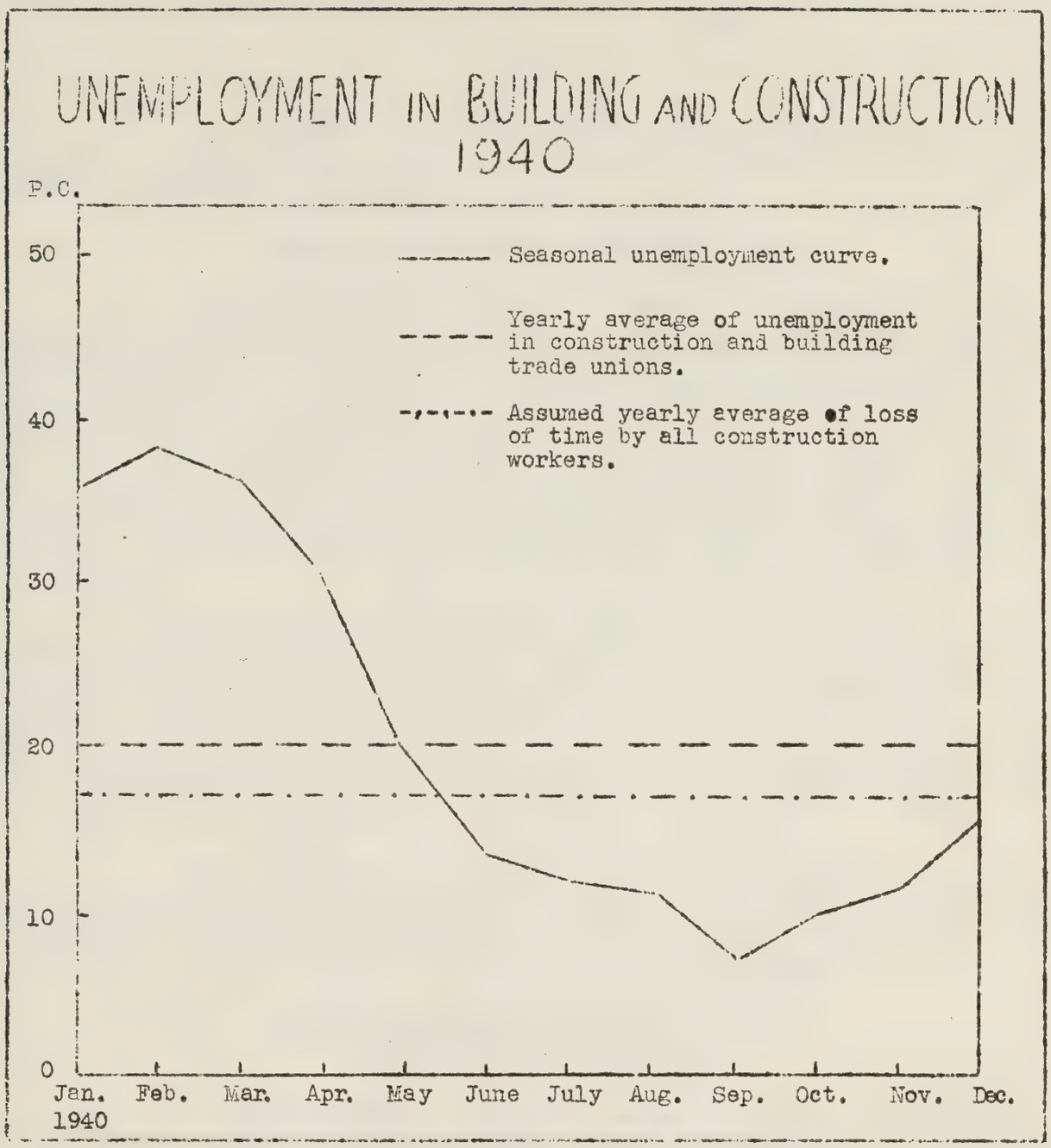

Chart showing the monthly changes of unemployment in construction and building trade unions during 1940 expressed in percentage of those employed, the yearly average of unemployment and the assumed loss of time by all construction workers during the year. Data taken from "Unemployment in Trade Unions at the close of December, 1940", "Labour Gazette", Department of Labour, February 1941, Vol. XLI, Number 2, p.161. For an explanation of the estimate see text.

"salaried employees", the figure of 25,810 salaried employees must be divided into two components by using an auxiliary device. It is assumed that the 11,539 owners and managers as reported in the National Registration, 1940, were included in the Construction Census for 1940. Using the latter figure the desired two components of persons classified as "salaried employees" in the Construction Census are:

Owners and Managers	11,539
Clerical Staff and persons of "other professional occupations"	14,271
Total	25,810

Thus in 1940 there was a total of approximately 135,500 persons engaged in construction industry (clerical staff and persons of "other professional occupations" excluded).

Skilled and Unskilled Construction Workers.

The foregoing figure includes a number of men who have no skill and do mostly digging and hauling of earth. There is no official estimate of skilled and unskilled labour employed in the construction industry. There is available, however, a breakdown of construction costs which the Carter Halls Aldinger Company of Winnipeg prepared for a big construction project in 1935. This project is discussed in more detail in Section V. Here it may only be said that it was found that about 12½ per cent of man-hours directly employed on the construction project consisted of digging and hauling of earth. Unskilled labour was used for this purpose. There was also a number of helpers and other labourers employed on other building operations who cannot be classified as craftsmen.

It can reasonably be assumed that on an average there is more unskilled labour used on roads and other construction work than on buildings. In many cases it will be found that in certain periods, as for example the depression period of the early 1930's, there is a desire to use a great number of unskilled persons on construction jobs in order to provide employment. However, these conditions do not represent what has been termed "normal conditions", when it appears advisable and economical to do most of the hauling and digging with the help of modern machinery.

Some information as to the ratio of skilled and unskilled persons employed in construction might be obtained from the Population Census 1931. Though some persons might consider these figures outdated, they give an approximate idea of what can be the answer to the problem which we are facing.

The Problem of Skill Analysed in the Light of the 1931 Census.

The Census 1931[1] reports the number of persons gainfully occupied in construction industry as 256,308. There were 165,028 persons gainfully occupied in "building and structures"[2], 84,971 in "other and unspecified construction" and 6,309 in "shipbuilding". There were thus about 250,000 persons reported as gainfully occupied in construction industry excluding shipbuilding.

This labour force consisted of approximately 164,000 construction

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(1) Population Census 1931, Vol.VII, p. 838, Table 58.

(2) Terms taken from Census 1931, Vol.VII, pp. 838-840.

craftsmen, approximately 76,000 persons described as "labourers and unskilled workers", and approximately 10,000 persons in clerical or "other professional occupations". That means that the labour force employed in construction industry in the year previous to the taking of the Population Census comprised approximately 164,000 skilled and approximately 76,000 unskilled labourers, the ratio of unskilled to skilled being 46.3 per cent.

It is important at this stage to make two reservations on why the ratio of skilled to unskilled labour force prevailing in the year previous to the taking of the Census 1931 cannot be accepted for the year 1940.

Firstly, technological improvements have reduced the use of unskilled labour considerably. Huge digging and other machines have taken the place of thousands of common labourers previously employed in the construction field. These technological changes have less effect on the tradesmen, since their individual skill has as yet not been replaced to any appreciable extent by machines, although plans of "prefabricated houses" for the post-war era might, if carried into effect, affect considerably the skilled construction worker.

Secondly, when the Census of 1931 was taken, the depression of the early thirties, though in its beginning, had already had serious effects on the Canadian economy. The desire to employ more hands changed to some extent the policy of the public authorities, especially of the municipalities, in their choice and method of carrying out public works. Where possible, unskilled labour instead of machinery was employed on construction projects. This practice became especially marked when the depression affected seriously the economy of this country in 1933 and 1934.

It appears, therefore, to be reasonable to assume that in 1940 the ratio of skilled to unskilled construction workers was lower than that in the year previous to the taking of the Population Census of 1931. It was probably somewhere between 30 per cent and 40 per cent. To make the estimate conservative 30 per cent will be assumed, in this study, to indicate the ratio of unskilled to skilled construction workers. (1)

It appears that a study of the problems of the use of skilled and unskilled labour in construction projects would be highly desirable. Until such date, however, the above assumption will have to suffice. (2)

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(1) The 1941 Census, when completed, will probably show that this ratio is somewhat lower than the actual figure. This assumed ratio might suffice, however, to indicate the method of approach to our problem and the result of the study can be adapted as soon as the work on the Census 1941 is completed.

(2) The compilation of data on the proportion of skilled to unskilled workers for the various types of construction projects may be especially important in connection with post-war problems. Assuming that it is desired for the post-war period to undertake a construction program of proportions which this country has not experienced before, it may be found that, even if financial difficulties and problems of supplying the necessary construction material are solved, there are not enough construction craftsmen available in this country to carry out the construction program in the desired dimensions and in the prescribed time. In such a case the following ways are open to carry out the construction program planned without reducing its scope:

(1) An increase in the number of craftsmen either (a) by an increased training of apprentices, or (b) by allowing immigration of construction craftsmen from other countries, or (c) by a combination

Assuming that 30 per cent of the persons engaged in construction work throughout 1940 were unskilled, the number of skilled persons in construction occupations, as reported by the Construction Census, was about 94,800.

Construction Work not Included in the Construction Census.

Let us now consider the adjusted figure given for persons in construction occupations as reported by the National Registration in 1940 whom we consider to have been working throughout 1940. It was found that there were 166,000 personsin this category, representing the full-time equivalent of all construction craftsmen enumerated in the National Registration. If we deduct from this total the figure of 94,800, the number of persons in construction occupations reported by the Construction Census, we find that there were 71,200 persons in construction occupations whose activities were not reported by the Construction Census. This group of people, however, were fully employed throughout 1940. It is obvious that they were doing some kind of construction work.

At this stage it is assumed that the proportion of clerical staff and persons in "other professional occupations" and of unskilled workers is the same for those persons in construction occupations not reported in the Construction Census as for the persons reported in the Construction Census.

It was found that there were 135,500 persons engaged in construction occupations and reported by the Construction Census, excluding clerical staff and persons in "other professional occupations" who numbered 14,271 or approximately 10.5 per cent. The total number of persons doing construction work but not reported by the Construction Census may be estimated, therefore, to consist of: persons in construction occupations - 71,200; clerical staff and

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of the methods described in (a) and (b).

(2) A change in the composition of the construction program by increasing the number of such projects which give employment to a comparatively low percentage of skilled craftsmen and a high percentage of unskilled workers (for example, more roads and less buildings). Thus a bigger construction program could be carried out with the skilled construction labour force available.

Other measures possible would involve the reduction of the size of the construction program or the stretching of the time in which the program is supposed to be carried out. In both cases, however, it might mean an undesirable reduction of the construction program. If we know, however, the ratio of skilled construction workers to the common labourer doing construction work, e.g., for roads and large buildings - the ratio will differ according to the type and size of the building but some average figures might be obtainable,-then we would be able to suggest - if there are not sufficient construction craftsmen available - that at least temporarily more roads be built and less large buildings. We could also indicate the number of skilled and unskilled men required for a construction program consisting of different components (roads, houses, dams, bridges, etc.), illustrating the limitations which every big building program faces even if financial difficulties and supply problems of construction material are solved.

Such data for a recent period might be obtained from the Dominion Bureau of Statistics once the working sheets for the Population Census, 1941, are completed. Technological changes after the war might change the ratio of skilled to unskilled workers. However, once such a ratio has been established for the different types of construction projects, the construction industry could be asked to report any technological changes which would affect the ratio. This ratio, kept up-to-date, would supply valuable information for the planning and carrying-out of a program of post-war construction projects.

persons in "other professional occupations" (10.5 per cent of 71,200) - 7,476 unskilled workers (30 per cent of 71,200) - 21,360. We therefore find that there were about 100,000 persons doing construction work whose activity was not reported by the Construction Census.

The Construction Census reports that throughout 1940 there were 149,830 or about 150,000 persons gainfully occupied in construction industry producing a gross value of approximately $474,000,000. In accordance with the above assumption the group of 100,000 persons not reported in the Construction Census produced two-thirds of the gross value of construction reported, amounting to approximately $316,000,000. Let us allow a margin of error in this estimate and reduce the total value of construction work not reported by the Construction Census excluding construction work done on rural and urban dwellings to $300,000,000.(1) It appears that construction activity in this country in addition to "industrial construction" as reported by the Construction Census, is considerable.

Railway, Telegraph and Telephone Construction.

It should be borne in mind that the estimated amount of $300,000,000 represents construction work not reported by the Dominion Bureau of Statistics, which has been shown in Figure I as circles 1, b - e. There is some indication that the above calculations give an approximate picture of the construction work not reported by the Construction Census. Expenditures by steam and electric railways and telegraph and telephone systems on maintenance of way and structures and maintenance of equipment have recently been published for 1940. Table XI on the following page shows that about $168,000,000 were spent in Canada for maintenance and construction work by the railway, telephone and telegraph companies (see circles 1, c - d of Figure I).

The Dominion Bureau of Statistics comments in the Canada Year Book for 1942 on the fact that the annual Census of Construction does not include maintenance and repair work on steam and electric railways, telephone and telegraph systems and the lesser public utilities, when such work is done by the employees of these concerns in the ordinary way: "It is doubtful whether a great deal of the work of railways and utilities is construction in the sense understood in the census: for instance, the routine 'maintenance of way' expenditures, so far as they relate to inspection work, are not construction although, so far as they concern rebuilding of line for roadbed or structures, they might be said to fall in that category... Most of the railway work is done by the railway employees but much of the telegraph and telephone work is done by contractors, and as it is not possible to break down the figures some duplications would result if these total expenditures were added to industrial construction performed by contractors".(2)

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(1) The above allowance is made in consideration of a few small factors of which the following is an example. It is probably that the ratio of skilled to unskilled workers of persons in construction occupations not reported by the Construction Census is somewhat lower than the ratio of skilled to unskilled persons in the construction industry reported by the Construction Census. This is partly due to the fact that a number of construction craftsmen not reported in the Construction Census are employed with the railway companies. It is known that the railway companies employ a comparatively small group of unskilled workers. As another allowance for this margin, the ratio of skilled to unskilled construction workers has been assumed purposely to be lower than the actual situation would warrant.

(2) Canada Year Book 1942, p.423.

TABLE XI

EXPENDITURES BY STEAM AND ELECTRIC RAILWAYS, AND TELEGRAPH AND TELEPHONE SYSTEMS ON MAINTENANCE OF WAY AND STRUCTURES AND MAINTENANCE OF EQUIPMENT, FOR 1940(1)

Type of Construction	Expenditure Dollars
Steam Railways -	
Maintenance of way and structures	63,864,526
Maintenance of equipment	82,738,679
Total, Steam Railways	146,603,205
Electric Railways -	
Maintenance of way and structures	2,771,379
Maintenance of equipment	4,865,755
Total, Electric Railways	7,637,134
Telegraph maintenance	660,331
Telephone maintenance	13,327,823
Grand Total	168,228,493

The Dominion Bureau of Statistics is quite right in stating that some duplications would result if the total expenditure for railway, telegraph and telephone construction work were added to industrial construction performed by contractors; but it should be possible to obtain from the railway companies, telegraph and telephone companies, a statement showing what part of their construction and maintenance work has been done by private contractors and what part by themselves. If this information could be obtained, duplications could be avoided and construction work done by the above-mentioned public utilities be added to industrial construction work undertaken. Thus the Construction Census would give a more complete picture, since hitherto the construction and maintenance work done by certain public utilities, such as electricity and gas companies, is included in the Construction Census, while the construction and maintenance work of other public utilities, such as the railway, telephone and telegraph companies, is not included.

Total Gross Value of all Construction Work.

We are now in position to estimate the total gross value of

(1) Data taken from the Canada Year Book 1942, p.423.

construction work done in Canada during 1940. It consists of:

(1) The total value of work performed by general and trade contractors and sub-contractors, the Dominion and Provincial Governments, the Harbours Board and the municipalities as reported by the Construction Census, approximately..... $ 474,000,000

(2) To that is to be added Professor MacGregor's estimate of construction work done on rural and urban dwellings. By using the same proportion as derived by him for 1937 (20.73 per cent) we obtain a figure of approximately..... 98,000,000
representing the value of construction work done on rural and urban dwellings throughout 1940.(1)

(3) We have to add further the gross value of construction work not reported by the Construction Census as calculated above, amounting in round figures to..... 300,000,000(2)

We thus arrive at the total of gross value of all construction work done in Canada in 1940 amounting to..... $ 872,000,000

Comments on the Construction Census.

Experience in other countries such as Great Britain and the United States has proved that it has not been possible to collect accurate information as to all construction work done in a country. (See also Section VII). It is, therefore, quite understandable that the Dominion Bureau of

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(1) Professor MacGregor comments that this figure is a very conservative estimate. In his opinion the expenditure on construction on rural and urban dwellings during 1940 might well have been higher than suggested in the above estimate. Professor MacGregor quite rightly points to the fact that in times of the up-swing phase of the business cycle, which marks the years of 1938 to 1940, an increased construction activity is noticeable. It might well be, therefore, that in proportion there was more construction work done on rural and urban dwellings in 1940 than in 1937.

(2) Some might comment that this estimate appears to be somewhat higher than the actual construction work done which the above calculations try to cover. A possible reply to this contention may well be that an analysis of the National Registration of 1940 allows us to infer that during this year there were more than two-thirds of the number of persons employed in construction - as reported by the Construction Census - not included in the report on the construction industry published by the Dominion Bureau of Statistics. It might, therefore, be reasonable to assume that the construction workers not reported in the Construction Census produced values amounting to about two-thirds of the value of construction as reported by the Construction Census, which is exactly what the above estimate intends to show in a rough way. Even allowing a broad margin of error, there is hardly any doubt that an important part of construction work done in Canada is not covered by the Construction Census.

Statistics includes in the compilation of the Construction Census only such data as can be secured without endangering the value of their reports by duplication or unavoidable inaccuracy. It is, however, important to bear in mind that the Construction Census covers only a part of all construction undertaken in Canada. Even if the above calculations deal with the problem which we are facing only in a rough way, they suffice to indicate that the Construction Census covers only about 55 per cent of all construction work done in this country.

That the need for additional statistics on construction is not only felt in Canada but also in other countries like the United States is well illustrated by the following quotation which has been taken from a report entitled "Construction, Housing and Real Property" prepared for the Bureau of the Budget, Executive Office of the President:(1)

"For satisfactory understanding of the characteristics of the contract construction industry, there is need for adequate bench-mark data on all firms doing construction work, including self-employed individuals (carpenters, plumbers, etc.) These bench-mark data should be obtained at least decennially, preferably in connection with the census of population. They should provide information for establishments whose principal business is contract construction, on type of organization volume of business, volume of employment and pay rolls, kind of business or type of construction work done, by location of firm, and by States and principal cities in which work is done.(2)

"In addition to comprehensive data for the contract construction industry, related bench-mark information is needed decennially on construction carried on by establishments which are engaged primarily in other industries. Information required for this purpose would include data on the volume and characteristics of construction work done, showing separately work done for others on contract and work done on own account. To supplement data already available, information of this type should be collected from all retail, wholesale and service establishments doing construction work; additional information should be obtained on construction work done by manufacturing establishments."(3)

In conclusion, it may be said that the above calculations give only an approximate estimate of the gross value of construction work not reported by the Construction Census. There is no doubt that many improvements in method and accuracy can be developed to estimate the total gross value of construction in Canada; but the above analysis may suffice to indicate the problem which we are facing and show a way in which it can be solved. It also emphasizes the need for additional statistics and the necessity for further studies of a few problems indicated above. If such work were undertaken, it would be of considerable assistance to those concerned with the role of the construction industry in Canadian post-war economic policy.

Comparison of Gross Value of Construction with Gross National Income, 1938-1940.

Let us now compare the gross value of total construction in Canada with the tentative estimate of Gross National Income or "Gross Product at Market

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(1) Jean H. Williams: "Construction, Housing and Real Property", a survey of available basic statistical data, a report prepared for the Executive Office of the President, Bureau of the Budget, Central Statistical Board, Washington, June 1940, pp.8 - 9.

(2) The additional statistics desired in this paragraph would approximately cover what has been shown as circle 1, e in Figure I.

(3) The additional statistics desired in this paragraph would approximately cover what has been shown as circle 1, b in Figure I.

Price", as called by the Research Staff of the Royal Commission on Dominion-Provincial Relations.

By assuming that the ratio of construction work reported and construction work not reported for 1940 applies also to the years 1938 and 1939 we can estimate the gross value of all construction done during this period.

The Research Staff of the Royal Commission has kindly given the writer access to their estimate of the Gross National Product for the years 1938-1940. These estimates represent the latest figure available and have been revised to July 20, 1942. These figures are, however, tentative only and subject to further revision.

The following table (number XII) gives a comparison of gross value of all construction with the gross national product. An illustration of this table will be found in Figure IX at the end of this section.

TABLE XII

COMPARISON OF GROSS VALUE OF CONSTRUCTION AND GROSS NATIONAL PRODUCT 1938 - 1940.

A	B	C	D	E	F
Year	Gross Value of Construction reported by the Construction Census	Estimated Gross Value of Construction not reported by the Construction Census	Total Value of all Construction (B + C)	Gross National Income	Ratio of D to E
	Million Dollars	Million Dollars	Million Dollars	Million Dollars	Per Cent
1938	353	297	650	5,070	12.8
1939	373	313	686	5,330	12.9
1940	474	398	872	6,550	13.3

The contribution of all construction to the Canadian gross national income varied, according to the above computation, between 12.8 per cent in 1938, 12.9 per cent in 1939, and 13.3 per cent in 1940, the three years' average being around 13 per cent.[1] This estimate is somewhat higher than that held by some members of the Research Staff of the Royal Commission on Dominion-Provincial Relations, who believe that the contribution of building and construction to the Canadian economy, though varying with the different phases of the business cycle, is on an average somewhat below 10 per cent. It appears, however, that it should not be too difficult to bring both estimates into a proper relation once a definition of building and construction on the lines indicated in Section II has been agreed upon.

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(1) When the reader uses the above average ratio of 13 per cent, it is imperative for him to bear in mind the range of definition of "Gross National Income" (see Section III, 4) and the fact that the estimates of "Gross National Product at Market Prices" by the Research Staff of the Royal Commission on Dominion-Provincial Relations are tentative only.

FIGURE IX

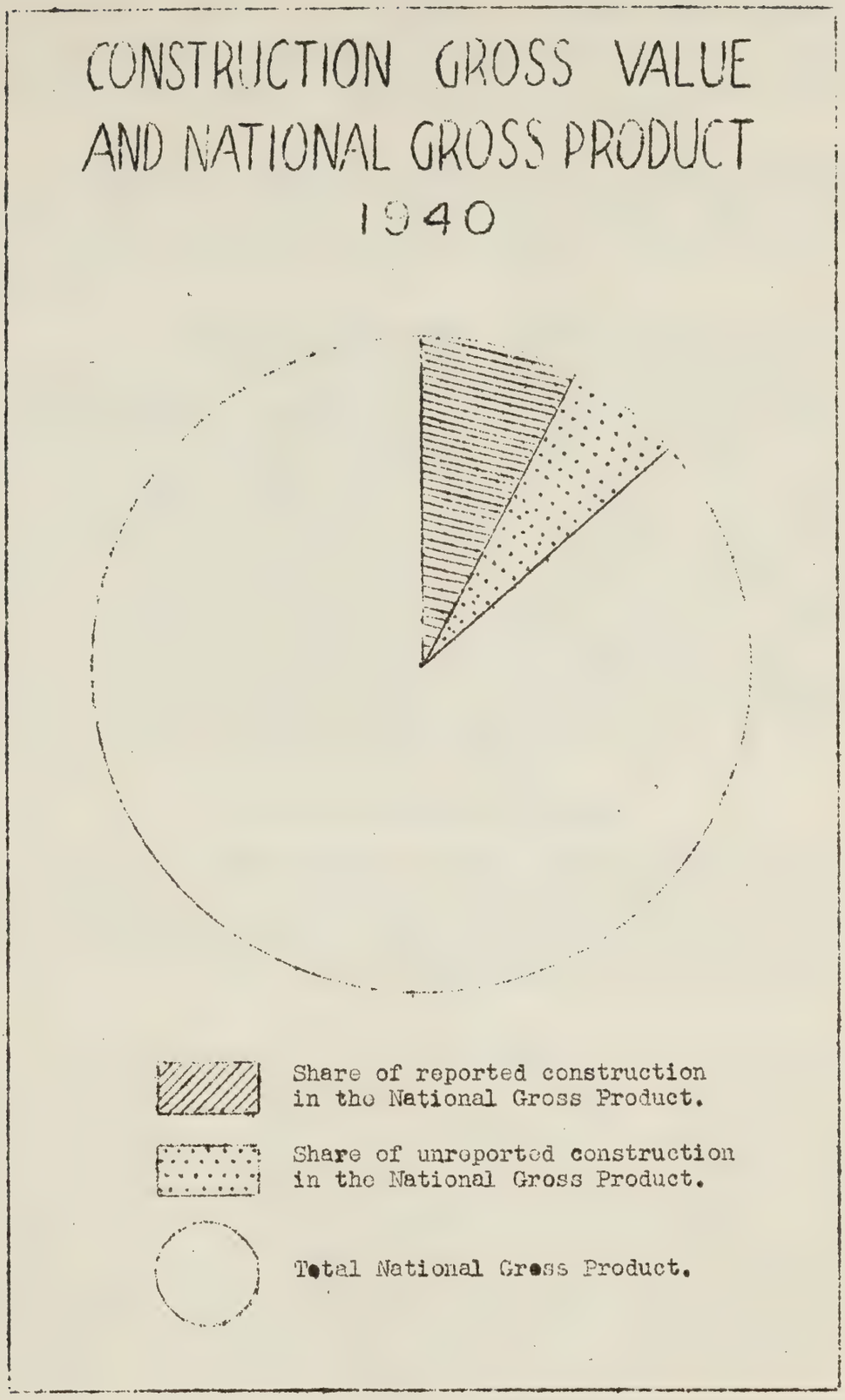

Chart showing what part of the National Gross Product as computed by the Research Staff of the Royal Commission consists of construction work reported and construction work not reported by the Construction Census of the Dominion Bureau of Statistics.

SECTION V

DIRECT AND INDIRECT EMPLOYMENT.

Ever since the depression struck Canada in the early thirties, voices could be heard asking for increased construction expenditure for the purpose of reducing unemployment in the country. Although a number of general statements as to the expediency and importance of building and construction as a field of employment were made, no systematic attempt was made in Canada to estimate the volume of employment expressed in terms of man-hours that could be created by a given expenditure for construction projects.

It is very much to the credit of a few enlightened contractors and others interested in the construction industry that they undertook privately, in the early thirties, a few studies analyzing the labour contents of certain construction projects. However, these studies related only to a small section of the construction field.

It is regrettable that little attention was paid to this type of research work done by private firms. The result was that the records, on which most of the studies were based, were disposed of and practically no further analysis undertaken, as revealed in a survey recently made by the writer. It is recognized that the field of employment created by building and construction is one of the most important aspects of this industry. However, no indications as to the size of employment can be given unless we can obtain at least some rough idea of the volume of employment created in the construction industry and in the construction material supplying and transporting industries by a given amount of construction expenditure. Galbraith points out that "the relation of ... construction activity to the level of employment constitutes ... a subject for inquiry of primary interest and significance in any attempt to analyze the past and potential contribution of expenditures" for construction purposes to economic activity and welfare. (1) The problem of employment in the construction industry and the construction material supplying and transporting industries is the subject of this section.

On-Site and Off-Site Employment

We distinguish between on-site or direct employment referring to employment in construction proper, and off-site or indirect employment referring to employment in the construction material supplying and transporting industries. The measurement of on-site employment is comparatively easy provided records are kept as to the man-hours paid for by a given construction project.

The measurement of off-site employment causes considerable difficulties. As it has been explained, off-site employment results from the purchase of materials used in construction and also from the administrative and other work required away from the site. To this has to be added work provided by the transportation of construction materials from the factories or storehouses to the site. No systematic studies have been undertaken in Canada to determine man-hours provided by the production and transportation of construction materials. We will, therefore, have to rely for the time being on an estimate which the writer has undertaken based on a survey of experiences made by a number of Canadian contractors. These experiences were checked with actual studies made in the United States giving due consideration to the fact that employment conditions in Canada differ from those in the United States.

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(1) J. K. Galbraith, assisted by G. G. Johnson, Jr.: "The Economic Effects of the Federal Public Works Expenditures, 1933-1938", a report prepared for the Public Works Committee, National Resources Planning Board, Washington, 1940, p. 38.

A further problem arises with respect to the unit of measurement of off-site and on-site employment. Employment is usually measured in man-years. However, the actual number of man-hours' work in one man-year may vary substantially, due to a number of reasons which have been described more fully in Section IV. It is for this reason that the Dominion Bureau of Statistics uses for most of their statistics a man-year of "full employment", which means that the hours, days, weeks' work are added in order to give one year of full employment. This full employment year is used, for example, in the Construction Census and is also referred to throughout the study. There is agreement among most sources that 2,000 man-hours represent a normal year of full employment.(1)

Let us now turn to Canadian estimates of on-site and off-site employment. Such estimates for large building projects undertaken in the middle of the thirties are available from the Carter-Halls-Aldinger Company, Limited, contractors in Winnipeg, and The Foundation Company of Canada, Limited, contractors in Montreal, which are discussed in the following.

Carter-Halls-Aldinger Company, Limited

In 1934 the Dominion Public Building was erected by Carter-Halls-Aldinger Company, Limited. The value of the building was $1,407,000, of which $423,300 or 30 percent was spent on labour, $711,000 or 51 percent on material and $272,700 or 19 percent on overhead expenses and profits.

The expenditure of $423,300 provided 705,820 man-hours of on-site labour. The average wage per man-hour amounted to approximately 60¢.

The expenditure of $711,000 for materials, the transportation of the materials to the site, and administrative and other work, provided 1,375,360 man-hours of off-site labour. Carter-Halls-Aldinger Company, Limited could not tell exactly what part of the $711,000 was spent on wages and salaries. An estimate as to what part of expenditure for construction material goes into wages and salaries is discussed later on in the section. Calculations based on this estimate show that the average wage rate per man-hour of off-site labour was 43¢. Figure XX (shown in Appendix IV) contains a summary of the survey made by Carter-Halls-Aldinger Company, Limited.

Having determined the volume of man-hours provided by on-site and off-site employment we can now find the ratio of on-site to off-site employment which amounts, for the project analyzed by Carter-Halls-Aldinger Company, Limited, to 1.95. This ratio can be described as an "employment function" indicating the off-site employment created by a given volume of on-site employment. It is of prime importance to distinguish this employment function from the "employment multiplier", which is used to show the relative importance of primary and secondary employment. The employment multiplier is discussed more in detail in Section VIII.

It is clear that the effects of employment in construction proper (shown as circle 1 in Figure I) upon employment in the construction material supplying and transporting industries (shown as circle 2 in Figure I) is different from the effects which employment in construction proper and in the construction material supplying and transporting industries (shown as circles 1 and 2 in Figure I) have upon employment in the consumer goods industries (shown as circles 6 and 7 in Figure I). If this distinction is constantly borne in mind when discussing construction as a field of employment, misunderstandings as to the volume of employment caused by a given construction expenditure will be avoided. (2)

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(1) See United States Department of Labour: "P.W.A. and Industry", "A Four-Year Study of Regenerative Employment", Washington, D.C., 1938, p. 18.

(2) See Mr. K. M. Cameron's statement before the Management Committee of the Canadian Construction Association, discussed in Section I.

The Foundation Company of Canada, Limited

During 1933-1934 a large factory building for Courtaulds (Canada) Limited was erected in Cornwall, Ontario, by the Foundation Company of Canada, Limited. The total cost of this project was $2,500,000.

According to calculations made by the Foundation Company of Canada, Limited, this project provided 1,074,769 man-hours of on-site labour and over 2,000,000 man-hours of off-site labour. Since no exact figure was given for off-site employment, the writer found it necessary to check the calculations made by the Foundation Company of Canada, Limited. Unfortunately the records were not available. The only information available was that the computation of off-site employment was discontinued after approximately 2,010,000 man-hours was reached. It had been found very difficult to determine the breakdown for a small residue of about $25,000 expended for certain construction material. In order to make the calculations undertaken by the Foundation Company of Canada, Limited complete, it was assumed that this $25,000 provided 40,000 man-hours. We thus find that the factory building for Courtauld's (Canada) Limited provided 1,074,769 man-hours of on-site employment and approximately 2,050,000 man-hours of off-site employment, the employment function being 1.91.

The similarity of the employment function of 1.95 for the Carter-Halls-Aldinger project and 1.91 for the Foundation Company of Canada project is striking. It corroborates the statement made by many contractors that the employment function for large building projects undertaken during a certain time is approximately the same for all projects and that the range of the employment function is comparatively small.

It is of great interest to compare the above findings with experience made in the United States. For this purpose construction projects analyzed by the Public Works Administration in the United States were chosen. It was found that an expenditure of one million dollars for a public building erected in the middle of the thirties provided 344,000 man-hours of on-site labour and 740,000 man-hours of off-site labour, the ratio of on-site to off-site employment being 2.15.

Table XIII on the following page gives a "comparison of Canadian and United States estimates of on-site and off-site employment for large building projects". For the purpose of making the studies of Carter-Halls-Aldinger Company, Limited, the Foundation Company of Canada, Limited and the Public Works Administration comparable, the man-hours per one million dollar contract were calculated (see column E of Table XIII). We find that the total of man-hours provided by one million dollar expenditure was lowest for the project analyzed. by the Public Works Administration, amounting only to 1,084,000 man-hours. The project analyzed by the Foundation Company of Canada, Limited provided 1,249,907 man-hours per one million dollars of contract, while the project analyzed by the Carter-Halls-Aldinger Company, Limited provided 1,479,161 man-hours. The fact that a given expenditure provides a different volume of employment in Canada and in the United States applies not only to large building projects but also to a number of other construction projects. This is mainly due to the fact that wage rates in the United States are higher than in Canada. A number of contractors, however, claim that the higher wage rates are equalized by the greater output per man-hour of the construction labour force in the United States.

The Labour Contents of Seven Selected Construction Projects in the United States

From what has been said above it becomes clear that an intimate knowledge of the problem of on-site and off-site employment is of considerable importance when plans for construction projects in the post-war period are laid. The necessity for such a study can hardly be over-emphasized. Since no systematic study of the problem of labour contents has been undertaken as yet in Canada, a comparison of on-site and off-site employment for a number of different construction projects analyzed in the United States may be of interest. Table XIV on the following page shows a compilation of on-site and off-site employment for seven

TABLE XIII

COMPARISON OF CANADIAN AND UNITED STATES ESTIMATES OF ON-SITE AND OFF-SITE EMPLOYMENT FOR LARGE BUILDING PROJECTS

A	B	C	D	E	F
Project	On-Site Labour Man-hours	Off-Site Labour Man-hours	Total of B & C Man-hours	Man-hours per $1,000,000 contract	Ratio of B to C
Carter Halls Aldinger Company Limited: Public Building in Winnipeg, 1934, Value $1,407,000(1)	705,820	1,375,360	2,081,180	1,479,161	1.95
The Foundation Company of Canada, Limited, Montreal Large factory building for Courtaulds (Canada) Limited, Cornwall, Ontario, 1933-1934, Value $2,500,000(2)	1,074,769	2,050,000	3,124,769	1,249,907	1.91
Public Works Administration in the United States: Public Building erected in the middle of the thirties, man-hours per $1,000,000(3)	344,000	740,000	1,084,000	1,084,000	2.15

(1) Data supplied by Carter Halls Aldinger Company, Contractors, Winnipeg, Toronto, Regina and Vancouver.

(2) Data supplied by the Foundation Company of Canada, Limited, General Contractors, Montreal and Toronto.

(3) Data taken from "P.W.A. and Industry", a Four Year Study of Regenerative Employment prepared by the Bureau of Labour Statistics of the United States Department of Labour in 1938, 75th Congress 3d Session, House Document No. 605, pp. 19 to 22.

selected construction projects per one million dollar expenditure. Figure X which follows Table XIV gives a graphic presentation of on-site and off-site employment for the different construction projects. Figure XI following Figure X shows the labour contents (total of direct and indirect employment) in a one million dollar expenditure for the seven selected construction projects. These projects range from public buildings, water and sewerage projects, reclammation developments, bridge construction, concrete and bituminous paving, to grading and drainage. It also gives the different ratios of off-site to on-site labour. We note from this table that the smallest volume of employment is provided by a one million dollar expenditure for public buildings (1,084,000 man-hours), while the largest volume of employment is provided by grading and drainage (1,453,000 man-hours). The figures contained in Table XIV have to be used with great caution for two reasons:

(a) Most of the figures were calculated in 1938 and 1939 and it is doubtful whether they apply to present conditions;

(b) It has already been emphasized above that employment conditions in Canada and in the United States differ markedly.

A short survey which the writer undertook with regard to checking these figures showed that in Canada a considerably greater volume of on-site labour was provided by public building and reclammation projects, while the volume of on-site labour provided by a one million dollar expenditure for bituminous paving and grading and drainage was smaller than shown in Table XIV.

Comments on the Importance of Measuring On-site and Off-site Employment

In this connection the following statement published by the United States Department of Labour is worth noting. It is obvious that the reference made by the Department of Labour to public works bears the same significance for every type of construction, be it private or public:(1)

"In judging the effectiveness of any program of public works as a means for reemployment, several groups of workers must be considered. First, there are the men who work on the job itself. They are the carpenters, bricklayers, stone masons, ditch diggers, cement finishers, and the host of other skilled, semiskilled, and unskilled men who work with them. Second, there are the men in the factories which provide the brick, cement, lumber, or steel to be used on the job. Back of them are the miners, the loggers, and others who supply the raw materials for the factories; and last, there are the men on transportation systems which carry the materials to the factory and, later, to the job.

"Employment of these secondary groups of workers (indirectly employed persons) is just as important in any reemployment program as the employment of men on the site of construction. For many types of public works the materials-makers and transportation men are numerically more important than the men on the job.

"Notwithstanding the recognized importance of materials-makers and transportation employees, it has been impossible, until recently, to measure with any accuracy the amount of indirect labour provided by public works projects in the United States. When a new road or bridge or a new school building was proposed, everyone knew that cement and brick and steel and lumber would be needed, but no one knew how many men would be employed in factories to make these materials or on the railroads or steamship lines to ship them to market. The importance of such information, now and in the future, to the Department of Labour in appraising a proposed program of public works from the standpoint of reemployment, and to the Federal agencies which are engaged in supervising and operating public works programs, can hardly be overemphasized."

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(1) United States Department of Labour: "P.W.A. and Industry", "A Four Year Study of Regenerative Employment", Washington, D.C., 1938, pp. 3-4.

TABLE XIV.

COMPARISON OF ON-SITE AND OFF-SITE EMPLOYMENT IN THE UNITED STATES PER $1,000,000 CONTRACT FOR SEVEN SELECTED CONSTRUCTION PROJECTS.

A	B	C	D	E
Type of Construction Project	On-site Labour, Man-hours	Off-site Labour, Man-hours	Total of B and C	Ratio of On-site to Off-site Labour (B to C)
Public buildings(1)	344,000	740,000	1,084,000	2.15
Water and sewerage projects(1)	387,000	760,000	1,147,000	1.96
Reclamation developments(1)	402,000	691,000	1,093,000	1.71
Bridge construction(2)	595,000	684,000	1,279,000	1.14
Concrete paving(2)	535,000	619,000	1,154,000	1.15
Bituminous paving(2)	814,000	601,000	1,415,000	0.73
Grading and drainage(2)	880,000	573,000	1,453,000	0.65

(1) Estimates from "P.W.A. and Industry", a Four Year Study of Regenerative Employment prepared by the Bureau of Labour Statistics of the United States Department of Labour in 1938, 75th Congress 3d Session, House Document No. 605, pp. 19 to 22.

(2) Estimates from "Labour Requirements in Road Construction", by Lillian Lunenburg, published in "The Monthly Labour Review" of the Bureau of Labour Statistics, United States Department of Labour, Washington, April 1939.

FIGURE X.

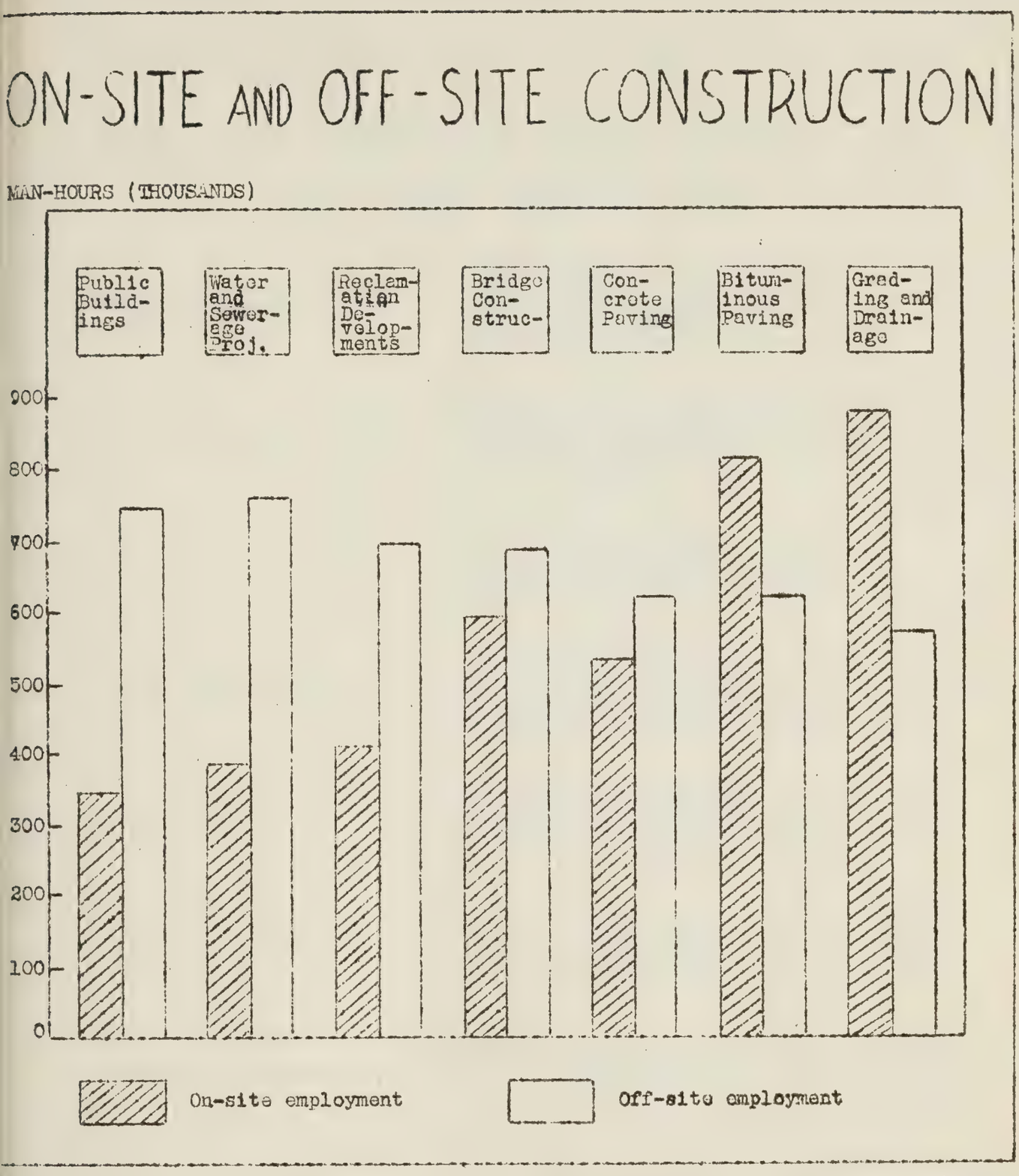

Chart showing the comparison of on-site and off-site employment per $1,000,000 contract for seven selected construction projects undertaken in the United States. For sources of statistics see previous table.

FIGURE XI.

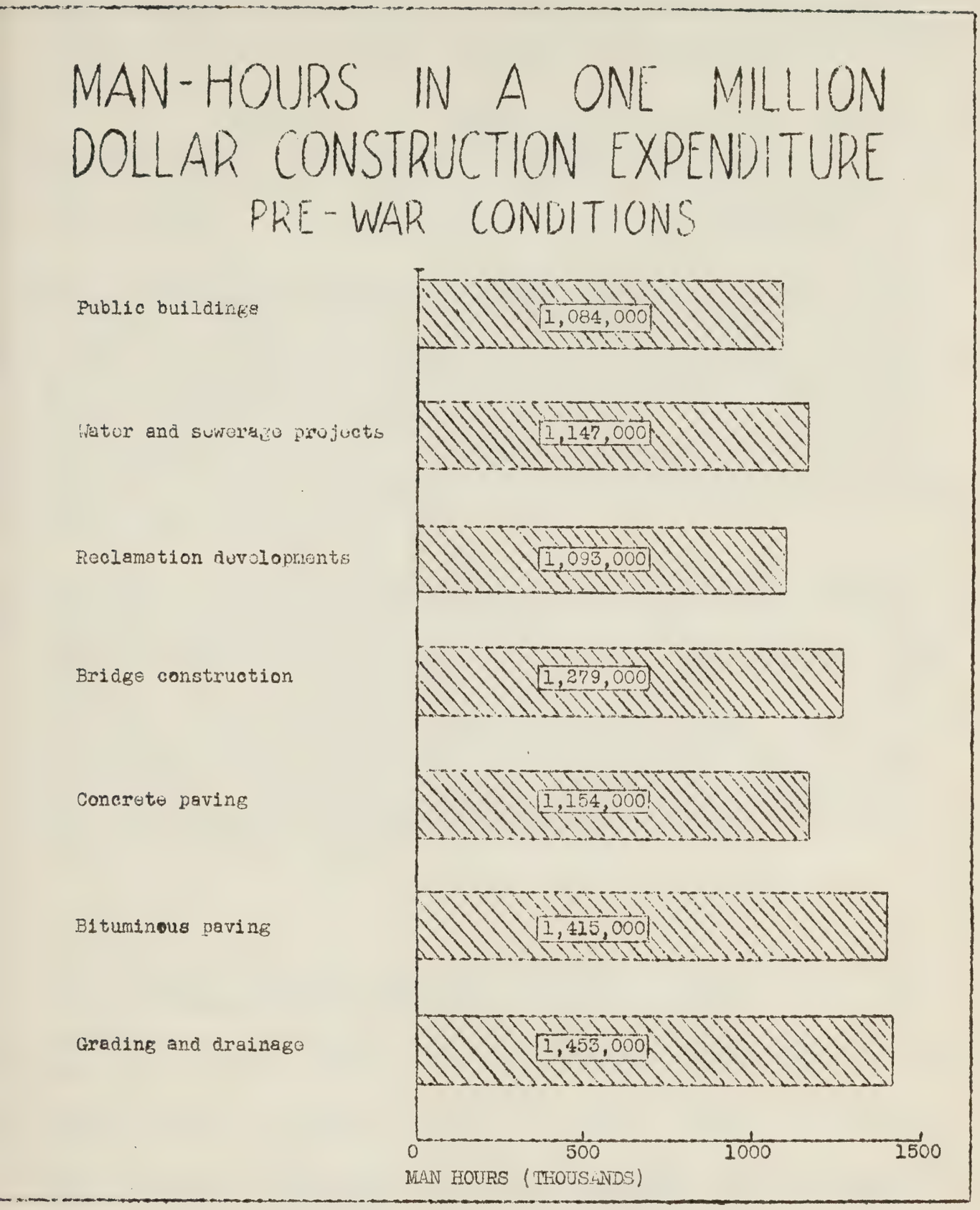

Chart showing the labour contents (man-hours) in a one million dollar expenditure for seven selected construction projects in the United States. For sources of statistics see Table XIV.

Since the necessity of measuring off-site employment was recognized in the United States, a number of studies were undertaken mainly by the Department of Labour. For the purpose of measuring the labour contents for a number of construction materials the following studies have an important bearing: "Man-Hours of Labour per Unit of Output in Steel Manufacture" (1), "Labour Requirements in Cement Production" (2), "Labour Requirements in Lumber Production" (3), "Labour Requirements in the Production of Clay Products" (4), "Labour Requirements in Production and Distribution of Plumbing and Heating Supplies" (5), and "Labour Requirements in Production and Distribution of Sand and Gravel" (6).

Galbraith based his estimates of off-site employment created by Federal Public Works Expenditures 1933-1938 on the above mentioned studies. He emphasizes in his report repeatedly the importance of measuring off-site employment based on an analysis covering all stages from raw material extraction to final fabrication and transportation to the site. He also makes the following qualifications as to the possible margin of error of these calculations:

"In any appraisal of the relationship of public works construction to employment, it is of course necessary to include the off-site as well as the on-site labour. However, before proceeding to the detailed calculations, it should be emphasized that the off-site estimates must always be used with caution. It is doubtful if the ratios of off-site employment reflect accurately, in any one time period, the actual labour required to administer the projects and to supply materials for public works construction. The required off-site labour will vary not only with the volume of material orders and the size of the project but also with the productivity of labour in the supply industries. Productivity in specific factories changes substantially from year to year, not so much as a result of technological developments, as from the changing relationship of production to capacity. ..."

"The number of additional workers, as distinct from man-hours, is influenced by the existing volume of part-time employment, which is characteristically large at low levels of production. When a factory is working at 30 percent of capacity, a 25 percent rise in production might involve no additional workers at all, and it might require a far less than proportionate rise in man-hours. As noted, the Bureau of Labour Statistics studies are based on a cost accounting procedure--the volume of employment in construction supply industries is prorated according to the share of the total volume of business represented by government orders. This probably is the only practicable method of making the estimates. However, in many cases, an accurate appraisal would require that a marginal analysis be used; given the existing volume of employment, it would be necessary to estimate the further employment generated by an increase in orders as a result of public works.

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(1) United States Department of Labour: "Man-Hours of Labour per Unit of Output in Steel Manufacture", "Monthly Labour Review", May 1935.

(2) Ibid.: "Labour Requirements in Cement Production", "Monthly Labour Review", March 1936.

(3) Ibid.: "Labour Requirements in Lumber Production", "Monthly Labour Review", May 1937.

(4) Ibid.: "Labour Requirements in the Production of Clay Products", "Monthly Labour Review", December 1937.

(5) Ibid.: "Labour Requirements in Production and Distribution of Plumbing and Heating Supplies", "Monthly Labour Review", June 1938.

(6) Ibid.: "Labour Requirements in Production and Distribution of Sand and Gravel", "Monthly Labour Review", July 1939.

"The calculations of off-site man-hours, therefore, may somewhat overstate the actual increase in man-hours worked in construction supply industries as a result of public works orders. Furthermore, the estimates of off-site employees as distinct from man-hours involve an additional error in that the current volume of part-time employment is not taken into consideration. Consequently, the actual number of persons given employment may well have been less than proportionate to the increase in man-hours. Finally, the possibility that substantial withdrawals from inventories may obviate, for a short interval, any increase in production to meet material orders, casts additional doubt on the accuracy of these estimates in any specific time period. This factor probably does not affect the estimates over a period of years. The estimates should be considered to represent the maximum volume of on-site and off-site employment which may have resulted from Federal construction activity. Over a period of time the estimates will be more reliable than they are as a statement of the off-site employment resulting from any given order or project."(1)

In conclusion it may be said that it will not be possible to determine exactly the number of man-hours used to produce a certain quantity of construction materials required to complete one construction project. Allowing a margin of error in the measurement of off-site employment, we will probably find that the margin of error will decrease considerably when the volume of construction analyzed is increased. In other words, the margin of error when determining the labour contents of construction material used in erecting a $5,000 house may be between 10 percent to 20 percent while the margin of error for an analysis of the volume of construction of $474,000,000, as reported by the Construction Census for the whole of Canada in 1940, might only be around 5 percent.

The importance of measuring the labour contents for a number of essential commodities has not only been recognized in the United States but also in a number of European countries where studies of these problems were carried much further than is done on this continent. An intimate knowledge of data referring to the labour contents of various essential commodities for peace and war purposes has enabled some European countries to plan ahead labour requirements for certain projects or certain areas, the results of which were, in some instances, bafflingly accurate, while in other instances a margin of error was found that had to be adapted according to actual findings. (2)

There is hardly any doubt that a close knowledge of the problem of labour contents in the production, transportation and distribution of a number of essential raw materials and commodities would not only be an important prerequisite for an efficient allocation of labour in wartime but also of considerable usefulness for the post-war period when employment for a great number of men will have to be provided. It appears advisable that such studies be undertaken in close cooperation with the industries concerned after a common pattern has been worked out. If such research work is not done in time, Canada may find itself in a position similar as the United States in 1934. The United States Department of Labour described the situation in 1934 as follows: "When a new road or bridge or a new school building was proposed, everyone knew that cement and brick and steel and lumber would be needed, but no one knew how many men would be employed in factories to make these materials or on the railroads or steamship lines to ship them to the market. The importance of such information, now and in the future, ... can hardly be overemphasized."(3)

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(1) J. K. Galbraith, assisted by G. G. Johnson, Jr.: "The Economic Effects of the Federal Public Works Expenditures, 1933-1938", a report prepared for the Public Works Committee, National Resources Planning Board, Washington, 1940, pp.42-43.

(2) Such studies were undertaken mainly in Sweden, Russia and Germany. The results of these studies were of importance for the allocation of labour supply in accordance with the requirements of the Russian Five-Year Plan and the German Four-Year Plan.

(3) United States Department of Labour: "P.W.A. and Industry", "A Four-Year Study of Regenerative Employment", Washington, D.C., 1938, pp. 3-4.

Bearing in mind what has been said about the importance of on-site and off-site employment in construction, we can now turn to the construction industry as a field of employment during 1919 to 1942.

Wage Earners in the Construction Industry

The term "wage earner" as used in the Population Census and a number of other reports published by the Dominion Bureau of Statistics refers to a person who works for a salary or wage irrespective of the nature of his employment. It is of great importance to distinguish the wage earner from the "gainfully occupied" as defined later on in this section.

Table XV on the following page shows a "comparison of the number of wage earners in construction industry excluding direct government construction with the total of wage earners in all industries 1919-1942". The figures in column B give the number of wage earners in the construction industry on a "full-time basis", that is, full employment throughout the year. The analysis of construction industry as a field of employment would have been more complete if an estimate of the number of wage earners in construction industry, including direct government construction for the period 1919-1942, were available. Such estimates of the number of wage earners in construction work directly undertaken by the public authorities have, however, not been made by the Dominion Bureau of Statistics.

We note from Table XV that 3.8 percent of wage earners in all industries were employed in construction industry excluding direct government construction. The ratio rose to 5.6 percent in 1922, decreased to 5 percent in 1924 and then rose again to 6.8 percent in 1928 and 1929. From 1930 onwards a marked decrease can be noted with 1.8 percent in 1933 and 1.9 percent in 1934. The years 1935 to 1937 show an increase in the proportion of wage earners in construction industry to wage earners in all industries, the ratio being 3.4 percent in 1937. This ratio remains unchanged in 1938, diminishes in 1939 and 1940 to 3.1 percent and 3.3 percent respectively. For the years 1941 and 1942 only tentative estimates are available. They show that 4.1 percent of all wage earners were employed in the construction industry in 1941 and 3.6 percent in 1942. The average for the period 1919-1942 is 4.4 percent, the average for the period 1936-1940, 3.2 percent.

In this connection it may be observed that the ratio of wages and salaries paid to persons occupied in construction industry, excluding direct government construction, to the total wages and salaries paid to all persons employed in Canada is not necessarily the same as the ratio of the number of wage earners in construction industry, excluding direct government construction, to the number of wage earners in all industries. The reason is that the wage rates within industries differ. For example, if we compare salaries and wages paid to persons employed with private contractors in 1940 - $99,000,000(1) - with the total wages and salaries paid - $2,860,000,000(2) - then we obtain a ratio of 3.46 percent. The ratio of wage earners in construction industry to all wage earners is 3.3 percent. Though the difference between both ratios is comparatively small, it will be useful to bear in mind that both ratios are not necessarily alike. The distinction between these ratios becomes more clearly visible when the figures contained in Table XVII are discussed. The findings of Table XV are illustrated in Figure XIII which follow Table XVIII.

The Construction Census provides us with data on the number of wage earners employed by general and trade contractors and sub-contractors. However, according to the compilation of the Construction Census, individual

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(1) See column B of Table VI.

(2) See column G. of Table VI.

TABLE XV.

COMPARISON OF THE NUMBER OF WAGE EARNERS IN CONSTRUCTION INDUSTRY EXCLUDING DIRECT GOVERNMENT CONSTRUCTION WITH THE TOTAL OF WAGE EARNERS IN ALL INDUSTRIES.

1919 - 1942

A	B	C	D
Year	Number of Wage Earners in Construction Industry Excluding direct Government Construction (1)	Number of Wage Earners in all Industries (1)	Ratio of B to C Percent
1919	71,800	1,884,003	3.8
1920	95,106	2,008,953	4.7
1921	87,602	1,801,895	4.9
1922	103,801	1,854,969	5.6
1923	100,688	1,932,869	5.2
1924	95,939	1,903,652	5.0
1925	99,334	1,956,434	5.1
1926	130,536	2,035,879	6.4
1927	143,616	2,136,012	6.7
1928	153,240	2,259,134	6.8
1929	159,447	2,343,533	6.8
1930	144,864	2,299,979	6.3
1931	101,863	2,094,381	4.9
1932	48,139	1,885,178	2.5
1933	31,720	1,826,826	1.8
1934	36,533	1,916,555	1.9
1935	49,794	2,000,521	2.5
1936	60,393	2,095,617	2.9
1937	76,137	2,242,494	3.4
1938	75,465	2,213,640	3.4
1939	71,643	2,297,698	3.1
1940	81,666	2,484,722	3.3
1941	113,990 (2)	2,804,302 (2)	4.1
1942	111,109 (2)	3,043,929 (2)	3.6
		Average 1919 - 1942	4.4
		Average 1935 - 1939	3.1
		Average 1936 - 1940	3.2

(1) Data supplied by the Business Statistics Branch of the Dominion Bureau of Statistics as per September, 1942. Statistics are given on a "Full-Time Basis", that is, full employment throughout the year.

(2) Estimates are tentative only and subject to further revision.

enterprisers, for example, a carpenter working on his own account, are included under the heading "Total Number of Employees". Since this compilation is in contradiction with the usual practice followed by the Dominion Bureau of Statistics which includes individual enterprisers and working proprietors under the heading "Gainfully Occupied", it has been found necessary to break down the figures contained in the Construction Census in order to make a comparison of like with like possible. The Business Statistics Branch of the Dominion Bureau of Statistics was kind enough to supply the breakdown desired. Table XVI on the following page shows a comparison of the number of wage earners in construction proper (wage earners employed by general and trade contractors and by the public authorities) with the number of wage earners in all industries for the period 1936-1940. It is of interest to note that the ratio amounted to 6 percent in 1936, gradually decreasing to 5.2 percent in 1940, showing us the levelling influence of employment in construction directly undertaken by the public authorities. The average for the period 1936-1940 was 5.7 percent. If we compare these figures, which are shown in column F of Table XVI with the figures in column D of Table XV, we find the different importance which construction work undertaken by general and trade contractors and construction work undertaken directly by the public authorities played during the period 1936-1940.

We are concerned now with estimating the total employment created in the construction industry as reported by the Construction Census for the period 1936-1940. To determine the total employment we will have to make an estimate of the number of persons engaged in the construction material supplying and transporting industries and add the result to the number of wage earners employed in construction proper as shown in column D of Table XVI.

It has already been emphasized in Section III and again at the beginning of this section that no estimates have as yet been made on the size of this type of employment. For the purpose of giving us a rough idea of the volume of this kind of employment, a survey has been undertaken of the experiences of a number of contractors. As a result of this survey it has been assumed that about 75 percent of the total value of construction material goes into wages and salaries for persons employed in the construction material supplying and transporting industries. This assumption is a very conservative estimate and has been made after the experiences of Canadian contractors have been compared with estimates of off-site employment made in the United States. The number of persons employed in the construction material supplying and transporting industries was found by dividing the estimated wages and salaries by the yearly average earnings of wage earners in Canada, data for which have been supplied by the Business Statistics Branch of the Dominion Bureau of Statistics as per September 1942.

Column F of Table XVII, which follows Table XVI, shows the total of all wage earners in construction proper and the construction material supplying and transporting industries. Comparing these figures with the total number of wage earners in all industries, we find that the ratio varied between 10.3 percent in 1936 and 12.1 percent in 1940, the average for this five-year period being 11.2 percent. If we compare this ratio with that of wages and salaries paid in construction proper and in the construction material supplying and transporting industries, with the total wages and salaries paid to all persons employed in Canada (Column H in Table VI) then we find that in the latter case the ratio amounted to 10.6 percent as against 11.2 percent in the former case. The difference of this ratio is explained by the effect of the different wage rates paid in different industries as mentioned before. When we talk of construction industry as a field of employment in relation to the total number of wage earners in Canada, then we have to use the ratio of 11.2 percent, being the average for the period 1936-1940. If we speak of the proportion of wages and salaries paid to persons employed in the construction industry as compared with all industries, then we have to use the ratio of 10.6 percent as the average for the period 1936-1940. However, both ratios have to be used with great care for the simple reason that they only deal with a section, admittedly a very great one, of Canadian economic activity. These ratios give no consideration to individual enterprisers and working proprietors who gain their livelihood by doing construction work; on the other hand, no consideration is given to the individual enterprisers and working

TABLE XVI.

COMPARISON OF THE NUMBER OF WAGE EARNERS IN CONSTRUCTION INDUSTRY (PRIVATE AND PUBLIC) WITH THE TOTAL OF WAGE EARNERS IN ALL INDUSTRIES.

1936 - 1940

A	B	C	D	E	F
Year	Number of Wage Earners Employed by General and Trade Contractors and Sub-contractors (1)	Number of Wage Earners Directly Employed by the Public Authorities (2)	Total Number of Wage Earners in Construction Proper (B + C)	Number of Wage Earners in all Industries (1)	Ratio of D to E Percent
1936	60,393	65,512	125,905	2,095,617	6.0
1937	76,137	54,787	130,924	2,242,494	5.8
1938	75,465	51,181	126,646	2,213,640	5.7
1939	71,643	57,267	128,910	2,297,698	5.6
1940	81,666	45,932	127,598	2,484,722	5.2
			Average Ratio 1936-1940		5.7

(1) Data supplied by the Business Statistics Branch of the Dominion Bureau of Statistics as per September 1942. Individual enterprisers (for example, a carpenter working on his own account) are not included in this column.

(2) Data taken from Construction Census for the years 1936-1940, published by the Dominion Bureau of Statistics. For the purpose of simplifying this estimate, it has been assumed that every person engaged to do construction work on projects undertaken directly by the public authorities was an "employee".

TABLE XVII.

COMPARISON OF THE TOTAL OF ALL WAGE EARNERS IN CONSTRUCTION INCLUDING THE CONSTRUCTION MATERIAL SUPPLYING AND TRANSPORTING INDUSTRIES WITH THE TOTAL OF ALL WAGE EARNERS IN CANADA.

1936-1940

A	B	C	D	E	F	G	H
Year	Estimated Wages and Salaries paid to Persons Employed in the Construction Material Supplying and Transporting Industries (1) Million Dollars	Yearly Average Earnings of Wage Earners (2)	Number of Persons Employed in the Construction Material Supplying and Transporting Industries(3)	Number of Wage Earners in Construction Proper(4)	Total of All Wage Earners in Construction (D + E)	Number of Wage Earners in All Industries(2)	Ratio of F to G
1936	92	1,022	90,020	125,905	215,925	2,095,617	10.3
1937	132	1,076	122,677	130,924	253,601	2,242,494	11.3
1938	133	1,100	120,909	126,646	247,555	2,213,640	11.2
1939	142	1,095	129,680	128,910	258,590	2,297,698	11.3
1940	200	1,151	173,762	127,598	301,360	2,484,722	12.1
						Average 1936 - 1940	11.2

(1) For the estimate of salaries and wages paid to persons employed in the construction material supplying and transporting industries see note (3) of Table VI.
(2) Data supplied by the Business Statistics Branch of the Dominion Bureau of Statistics as per September 1940.
(3) The number of persons employed in the construction material supplying and transporting industries is computed by dividing the estimated wages and salaries paid by the yearly average earnings.
(4) For the computation of the number of wage earners in construction proper see Column D of Table XIII.

FIGURE XII.

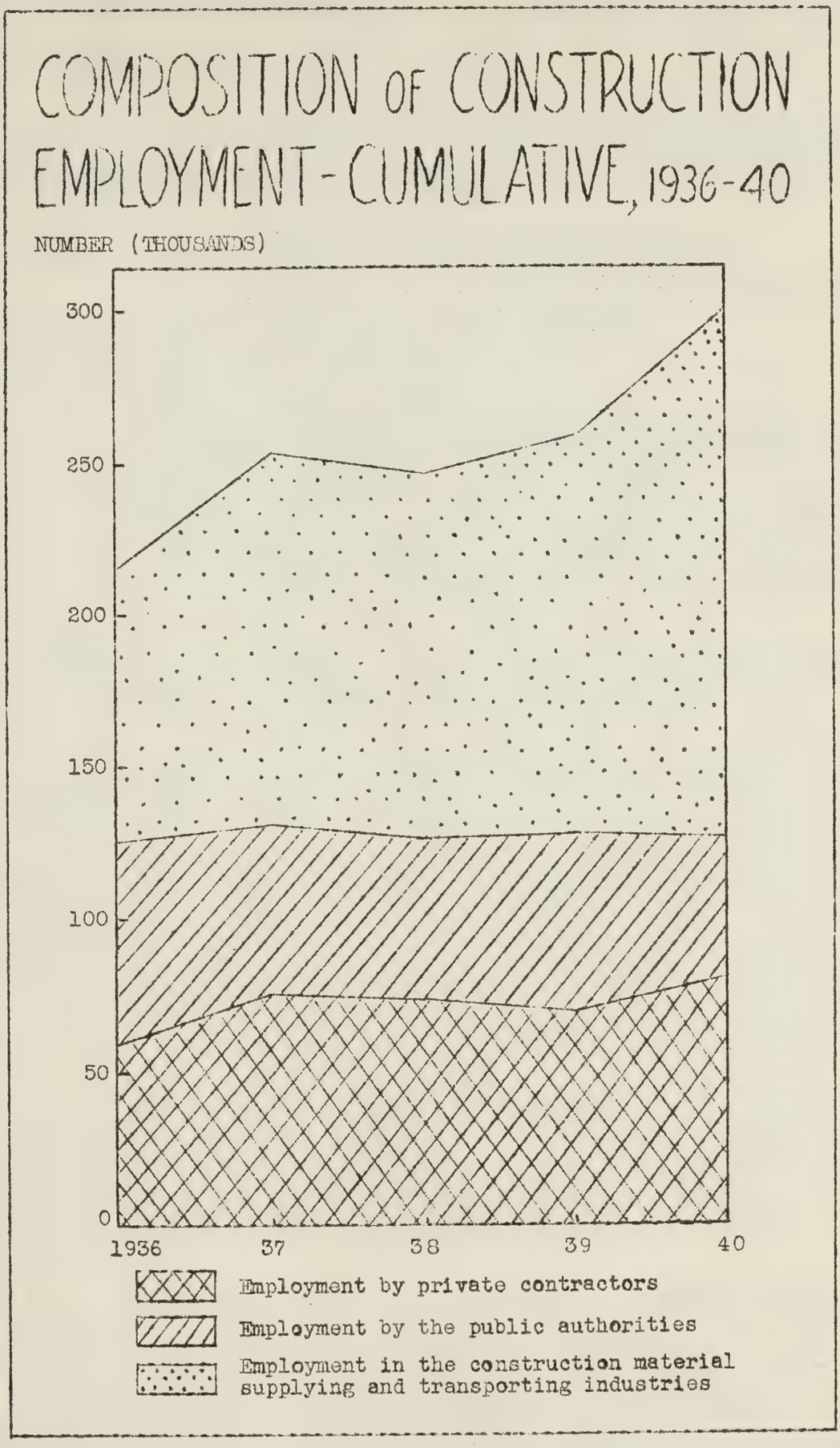

Chart showing in a cumulative way the components of employment in construction industry and the construction material supplying and transporting industries. For sources of statistics see Tables XVI and XVII.

proprietors, such as farmers, small retailers, doctors, solicitors, etc., the aggregate of which make up the total number of gainfully occupied persons in this country. It is very important to bear this distinction in mind, because in its popular meaning the term "wage earner" is often used to describe all persons gainfully occupied in one or a number of industries. This distinction is shown diagrammatically in circles 8 and 9 of Figure I.

The findings in Table XVI and Table XVII are illustrated in Figure XII which follows Table XVII. This figure shows in a cumulative way the components of employment in the construction industry and the construction material supplying and transporting industries.

Gainfully Occupied in the Construction Industry

The term "gainfully occupied" is the widest term used to describe all those who earn their living by work. They consist of

(1) the wage earner as previously defined;

(2) the individual enterpriser or the working proprietor who is a person conducting a business which he controls. Some enterprisers have other persons working for them and we call them employers. Others work by themselves like many small farmers, small retailers and doctors. The essential fact distinguishing the enterpriser from the employee is that the former takes the risk of the enterprise and does not receive for his services a fixed rate of compensation;

(3) the "unpaid labourer" is a person who does not receive a fixed remuneration in cash, the payment being limited to a living allowance mainly in kind, e.g., the farmer's son.

Table XVIII on the following page gives a comparison of the number of gainfully occupied in the construction industry excluding direct government construction with the total of gainfully occupied in Canadian enterprises and in the armed forces for the period 1919-1942. The ratios shown in column D of this table are somewhat lower than those shown in column D of Table XV. The reason is that the ratio of the number of enterprisers and unpaid labourers in the construction industry to the total of all individual enterprisers and unpaid labourers in Canada is much smaller than the ratio of the wage earners in construction to the total of wage earners in all industries. This fact has naturally a bearing on the ratio of the gainfully occupied in construction to the total of gainfully occupied. The average ratio 1919-1942 shown in Table XVIII is 3.5 percent, the average ratio for 1936-1940 is 2.5 percent.

Figure XIII which follows Table XVIII shows the "relative importance of construction employment, 1919-1942", in other words it shows the relative importance of the proportion of wage earners in construction industry (excluding direct government construction) to the total of wage earners in all industries (the former expressed in percentages of the latter) and of gainfully occupied to the total of all gainfully occupied in Canadian enterprises including the armed forces (the former expressed in percentages of the latter).

It appears, finally, to be desirable to estimate the total number of persons gainfully occupied in construction industry and in the construction material supplying and transporting industries. We experience here the same difficulties as outlined before when an estimate of the number of wage earners in the construction material supplying and transporting industries was made. Fortunately the difference between the number of wage earners and the number of gainfully occupied in the construction material supplying and transporting industries is not very great. It is clear that the number of individual enterprisers is relatively small when compared with the total number of wage earners. There is, however, no way to determine the number of individual enterprisers

TABLE XVIII.

COMPARISON OF THE NUMBER OF GAINFULLY OCCUPIED IN CONSTRUCTION INDUSTRY EXCLUDING DIRECT GOVERNMENT CONSTRUCTION WITH THE TOTAL OF GAINFULLY OCCUPIED IN CANADIAN ENTERPRISES AND IN THE ARMED FORCES.

1919 - 1942

A	B	C	D
Year	Number of Gainfully Occupied in Construction Industry Excluding Direct Government Construction(1)	Number of Gainfully Occupied in Canadian Enterprises and in the Armed Forces(1)	Ratio of B to C Percent
1919	104,172	3,130,779	3.3
1920	138,459	3,273,334	4.2
1921	127,981	3,074,232	4.2
1922	149,904	3,125,701	4.8
1923	143,679	3,186,351	4.5
1924	135,217	3,150,150	4.3
1925	138,216	3,212,028	4.3
1926	174,060	3,316,311	5.2
1927	190,274	3,454,292	5.5
1928	201,614	3,619,774	5.6
1929	208,186	3,736,556	5.6
1930	187,572	3,699,170	5.1
1931	101,863	3,438,769	3.0
1932	48,139(2)	3,200,875(2)	1.5
1933	31,720	3,128,119	1.0
1934	46,479	3,225,236	1.4
1935	63,349	3,326,998	1.9
1936	76,834	3,445,812	2.2
1937	96,865	3,614,810	2.7
1938	96,010	3,585,092	2.7
1939	91,147	3,707,039	2.5
1940	103,898	4,025,483	2.6
1941	136,222	4,517,054	3.0
1942	133,341	4,909,150	2.7
		Average 1919 - 1942	3.5
		Average 1935 - 1939	2.4
		Average 1936 - 1940	2.5

(1) Data supplied by the Business Statistics Branch of the Dominion Bureau of Statistics, as per September 1942. Statistics are given on a "Full-Time Basis", that is, full employment throughout the year.

(2) The estimates for the years 1932-1942 are subject to revision upon the receipt of further information, especially from the decennial census of 1941.

FIGURE XIII.

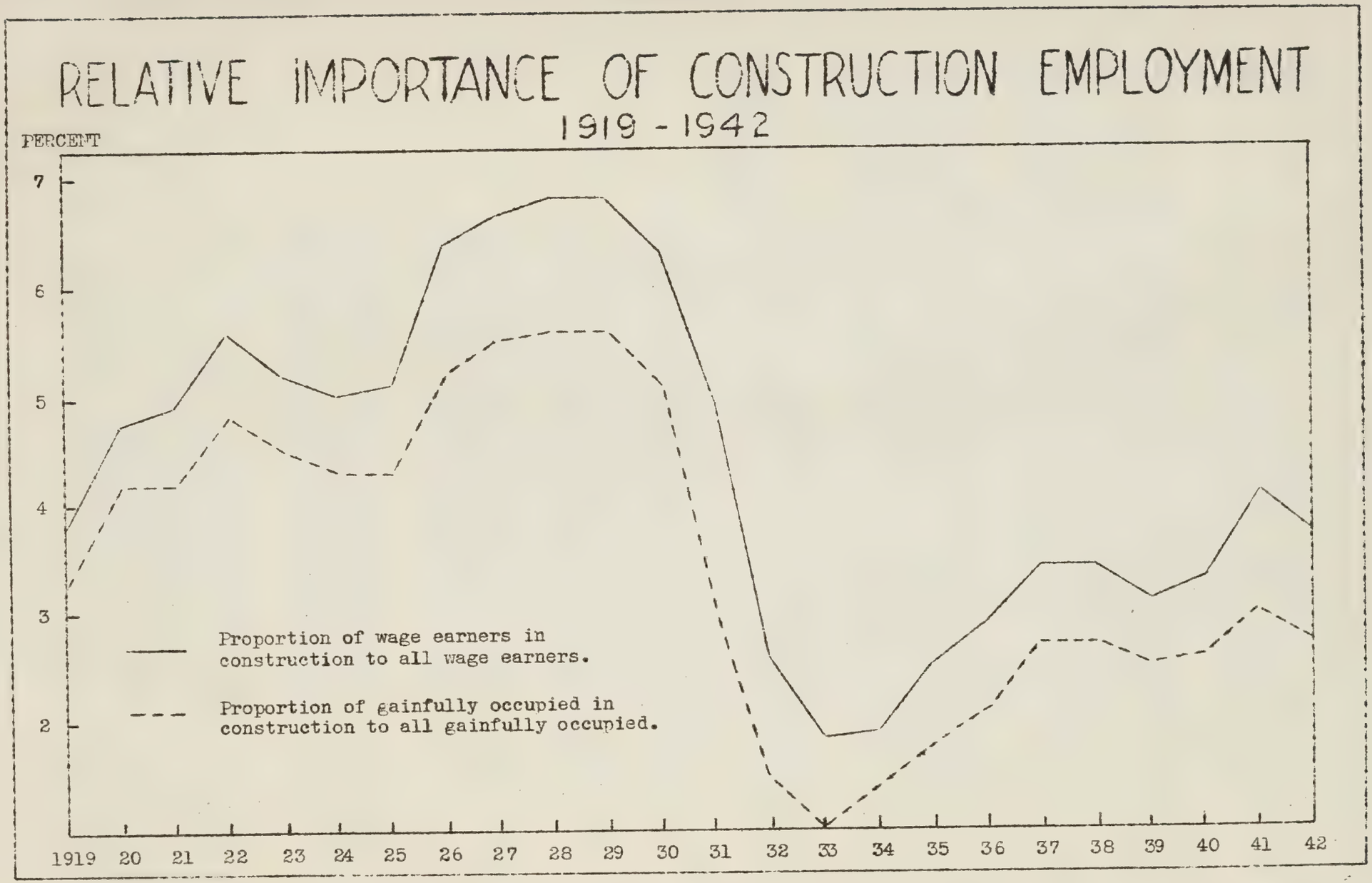

Chart showing the relative importance of the proportion of wage earners in construction industry (excluding direct government construction) to the total of wage earners in all industries (the former expressed in percentages of the latter) and of gainfully occupied to the total of all gainfully occupied in Canadian enterprises including the armed forces (the former expressed in percentages of the latter). For sources of statistics see Tables XV and XVIII.

engaged in the construction material supplying and transporting industries. It is quite clear that a number of small factory owners, for example, produce not only construction material but also a number of other commodities. However, it appeared advisable for the purpose of this study to make some distinction between the number of wage earners and persons gainfully occupied in the construction material supplying and transporting industries. For this reason it was assumed that 80 percent of the value of construction material goes into the remuneration to all persons gainfully occupied in the above mentioned industries as against 75 percent for persons employed. By assuming 80 percent the lower level of the estimates made by a number of contractors is reached. Practically all contractors whose experiences in the past were surveyed agreed that between 80 percent to 90 percent of the total cost of material goes into "wages and salaries" (this phrase means in this connection remunerations to all gainfully occupied).

Table XIX on the following page shows a comparison of all persons gainfully occupied in construction, including the construction material supplying and transporting industries, with the total of gainfully occupied in Canada for the period 1936-1940. The ratio varies between 6.7 percent in 1936 and 7.7 percent in 1940, the average for this five-year period being 7.3 percent. For reasons described above this average ratio must necessarily be smaller than the ratio which we obtained in comparing all wage earners in construction industry with the total of all wage earners in Canada.

Figure XIV, which follows Table XIX, shows for the period 1936-1940 the relative importance of the proportion of wage earners in construction industry and in the construction material supplying and transporting industries to the total wage earners in all industries (the former expressed in percentages of the latter), and of gainfully occupied to the total of all gainfully occupied in Canadian enterprises including the armed forces (the former expressed in percentages of the latter).

Summarizing, we find for the period 1936-1940 that construction proper and the construction material supplying and transporting industries provided employment and opportunities for gainful occupation in the following proportions:

(a) 3.2 percent being the ratio of the number of wage earners in construction excluding construction work undertaken directly by the public authorities to all wage earners.

(b) 2.5 percent being the ratio of gainfully occupied in construction excluding construction work undertaken directly by the public authorities to all gainfully occupied.

(c) 11.2 percent being the ratio of the number of wage earners in construction proper (including construction work undertaken directly by the public authorities) and in the construction material supplying and transporting industries to all wage earners.

(d) 7.3 percent being the ratio of gainfully occupied in construction proper (including construction work undertaken directly by the public authorities) and in the construction material supplying and transporting industries to all gainfully occupied.

Let us bear in mind that the figures contained in (c) and (d) can only be considered as of preliminary value until such a date when studies as to the labour contents of the production, transportation and distribution of construction materials have been made. They might, however, suffice to indicate in a rough way what section of the Canadian population depends for their livelihood either directly or indirectly on building and construction. It is, however, essential to bear in mind that this section does not deal with the secondary effects of construction expenditures. These effects are discussed separately in Section VIII.

TABLE XIX.

COMPARISON OF ALL PERSONS GAINFULLY OCCUPIED IN CONSTRUCTION INCLUDING THE CONSTRUCTION MATERIAL SUPPLYING AND TRANSPORTING INDUSTRIES WITH THE TOTAL OF GAINFULLY OCCUPIED IN CANADA.

1936 - 1940

A	B	C	D	E	F	G	H
Year	Estimated Total Earnings of Gainfully Occupied in the Construction Material Supplying and Transporting Industries (1) Million Dollars	Yearly Average Earnings of Gainfully Occupied (2) Dollars	Estimated Number of Gainfully Occupied in the Construction Material Supplying and Transporting Industries on a full time basis (3)	Number of Gainfully Occupied in Construction Proper on a full time basis (4)	Estimated Total of Gainfully Occupied in Construction (D + E)	Estimated Number of Gainfully Occupied including the Armed Forces (5)	Ratio of F to G
1936	98	1,112	88,129	142,344	230,473	3,445,812	6.7
1937	140	1,202	116,473	151,652	268,125	3,614,810	7.4
1938	141	1,197	117,794	147,191	264,985	3,595,092	7.4
1939	151	1,230	122,764	148,414	271,178	3,707,039	7.3
1940	214	1,333	160,540	149,830	310,370	4,025,483	7.7
						Average 1936 - 1940	7.3

(1) The estimated earnings of persons gainfully occupied in the construction material supplying and transporting industries is based on the assumption that 80 percent of the total cost of materials goes into wages, salaries and remunerations for individual enterprises.
(2) The yearly average earnings of gainfully occupied has been computed by dividing the national income by the number of gainfully occupied persons. Statistics for national income and gainfully occupied have been supplied by the Dominion Bureau of Statistics as per September 1940. They are subject to revision.
(3) The number of gainfully occupied in the construction material supplying and transporting industries on a full time basis is computed by dividing the estimated total earnings by the yearly average earnings per gainfully occupied persons.
(4) Data taken from the Construction Census for the years 1936-1940.
(5) Data supplied by the Dominion Bureau of Statistics; subject to revision.

FIGURE XIV.

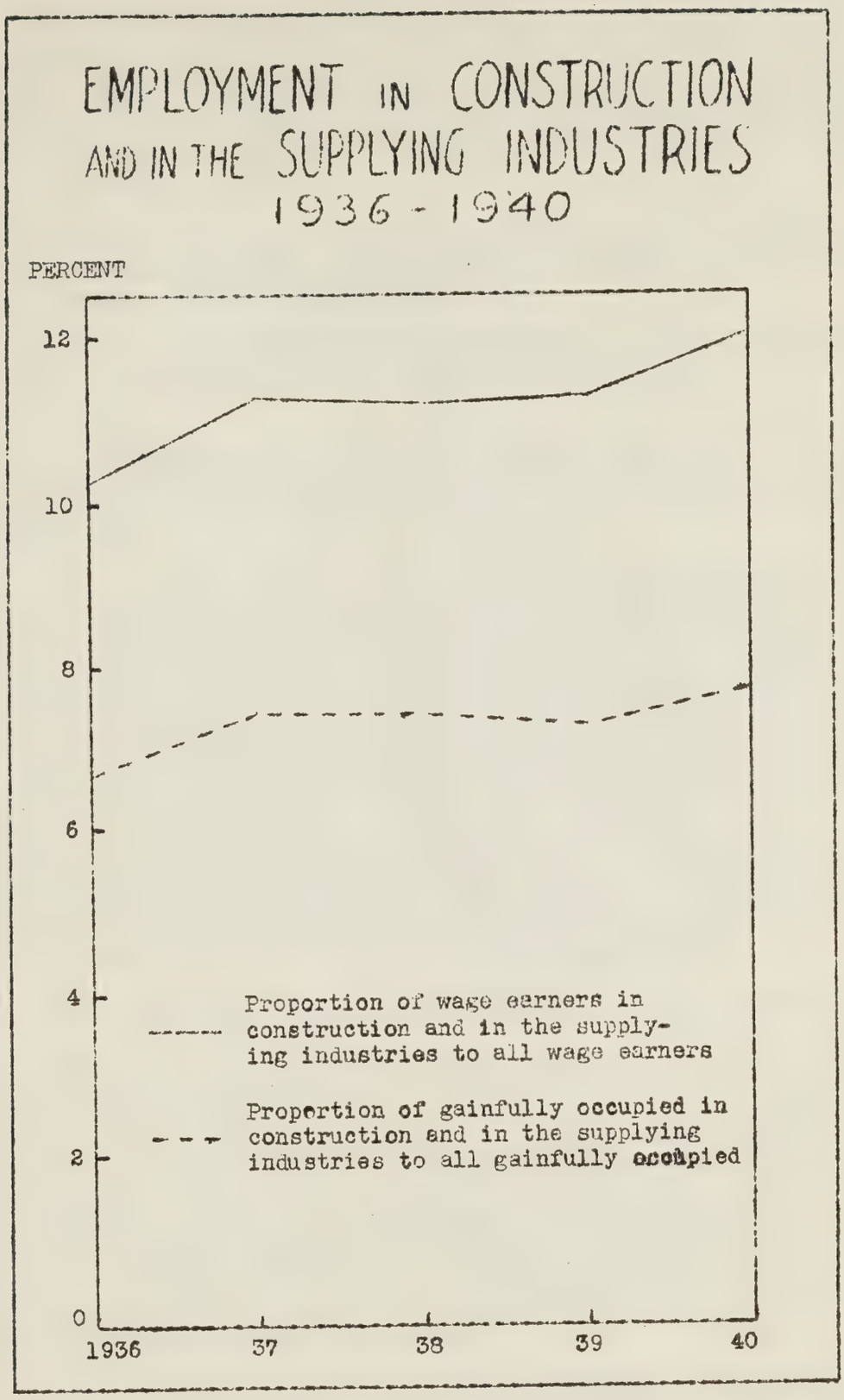

Chart showing the relative importance of the proportion of wage earners in construction industry and in the construction material supplying and transporting industries to the total wage earners in all industries (the former expressed in percentages of the latter) and of gainfully occupied to the total of all gainfully occupied in Canadian enterprises including the armed forces (the former expressed in percentages of the latter). For sources of statistics see Tables XVII and XIX.

SECTION VI

CONSTRUCTION COMPARED WITH OTHER INDUSTRIES

While reference was made in the previous sections to the importance of the construction industry in relation to the total economic activity of this country, the relationship of construction to other industries is analyzed in this section. Out of a number of methods the two following have been selected for the purpose of illustrating the position which building and construction occupies in the Canadian economy as compared with other spheres of economic activity.

1. (a) A comparison (using index numbers) of the physical volume of construction with the physical volume of iron and steel, of railway carloadings and of all business for the period 1929 - 1941.

(b) A comparison (using index numbers) of the long-term trend of construction, iron and steel, carloadings and all business for the period 1929-1941.

2. A comparison of construction with the other eight main branches of production in accordance with the Dominion Bureau of Statistics' specifications for the years 1929, 1933 and 1938, the turning points of the phase of the business cycle 1929 - 1938.

It is of importance to realize that the methods described above are intended to show two entirely different aspects of the role of building and construction. By the first method the cyclical trend and the long-term trend of construction are compared with those of other industries. The index referring to "all business" is a weighted average of 57 components referring to economic activity in the productive and distributive field. By the second method the relative importance of the contributions of the nine main branches of production to the total gross value of production is analyzed. According to the classification used by the Dominion Bureau of Statistics "production" includes the following industries: agriculture, forestry, fishing, trapping, mining, electricity, construction, custom and repair, and manufacturing. The "commodity handling" division consisting of transportation, communications and trade, and the "facilitating" division consisting of banking and finance, government activities, and service excluding custom and repair, are not considered.

1a. Physical Volume of Construction and Other Industries

The index of the physical volume of business and the various components which make up economic activity in this country is a very good method for the purpose of measuring economic changes. The importance of the index numbers lies in the fact that changes in prices (e.g. cost of materials and wage rates) are eliminated. The Dominion Bureau of Statistics emphasizes the usefulness of physical volume index numbers by saying: "The trend of industrial output is one of the essential factors in the measurement of economic progress. In the work of analysis, composite production data occupied a central position. Through an examination of the relationship of the business index with other fundamental economic factors historical sequences may be established that may prove of greatest value intentative for costing."(1)

The index of the physical volume of business is compiled on a monthly basis from a number of factors. It is a weighted average of 57 components constituting a considerable sample of the productive and distributive activities.

The index of the physical volume of construction is computed from "contracts awarded" (MacLean Building Reports), "building permits" (Dominion Bureau of Statistics) and "cost of construction" (Construction Census of the Dominion Bureau of Statistics).

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(1) Dominion Bureau of Statistics: "Original Monthly Statistics of Chief Economic Importance", supplement to the Monthly Review of Business Statistics, May 1934, p.1.

Table XX and Figure XV on the following pages show a comparison of the physical volume of construction with the physical volume of iron and steel, of carloadingsand of all business for the period 1929-1941. The average of 1935-1939 was used as a base and set equal to 100.

The fact that construction activity was at its peak in 1929 is illustrated by the construction index which amounted to 322.4 in this year. This figure represents the yearly average of indexes compiled on a monthly basis. Construction reached, according to this index, its lowest point in 1933 with 55.8, recovered in 1934 (70.3) and in 1935 (95.7), fell back in 1936 (89.6), and recovered in 1937 (113.0). In 1938 and 1939 construction showed a decrease (the index amounted to 100 in 1939), then recovered in 1940 and 1941, reaching in the last year (178.3) nearly the level of 1931.

Iron and steel amounted to 144.4 in 1929. It reached its lowest point in 1932 with 32.3. From 1933 onwards it recovered until 1937, when it reached 117.0. There was a slight decrease in 1938 (93.6) and 1939 (99.7). In 1940 and 1941 the effect of war orders is clearly recognizable, the index rising to 164.8 in the former year and 220.1 in the latter. Thus the physical volume of the iron and steel industry was approximately 50% higher in 1941 than it was in 1929.

The index of carloadings is a more general one, reflecting a wide variety of forces. As such, its fluctuations are less marked than those of construction and iron and steel. Thus, while the index of construction decreased from 322.4 in 1929 to 55.8 in 1933 (approximately five-sixths) and the index of iron and steel decreased from 144.4 in 1929 to 32.3 in 1932 (approximately three-fourths), the index of carloadings decreased only from 142.7 in 1929 to 81.3 in 1933 (not even one-half). The index of carloadings recovered from 1933 onwards reaching 105.8 in 1937. In 1938 and 1939 it showed a small decrease, then rose to 113.6 in 1940 and 128.8 in 1941. Figure XV shows clearly that the fluctuations of the industries analyzed were greatest for construction and smallest for carloadings.

For the purpose of comparison the volume of all business is analyzed. This index amounted to 109.6 in 1929 and reached its lowest point in 1932 with 68.7. From then onwards the curves for carloadings and of all business are very similar. The business index for 1941 was 135.6.

1b. The Long-Term Trend of Physical Volume of Construction and Other Industries

The curves in Figure XV show the marked fluctuations of construction and other industries during the period 1929-1941. It is clear, however, that these curves are the result of a number of forces at work, some of which are of a periodic nature while others are characterized by their suddenness and irregularity. By eliminating these factors, the long-term trend or "secular trend" of construction and the other industries analyzed can be determined.

By secular trend is meant the smooth, regular, long-term movement of a statistical series. Frequent and sudden changes either in absolute amount or in rate of increase or decrease are eliminated from a presentation of statistics intended to show the long term trend only. It is evident that a number of fluctuations of a periodic nature (for example, seasonal variations) and of a more irregular nature (for example, variations due to emergencies such as the present war) can modify the effects of a long term movement considerably. Carl Snyder says of the secular trend that "no other method enables us so quickly to set economic events in their just perspective"(1) It is for this reason that

(1) Carl Snyder: "Business Cycles and Business Measurements", New York, Macmillan, 1937.

TABLE XX

COMPARISON OF PHYSICAL VOLUME OF CONSTRUCTION WITH THE PHYSICAL VOLUME OF IRON AND STEEL, OF CARLOADINGS AND OF ALL BUSINESS.(1)

1929 - 1941

Year	Volume of Construction Index	Volume of Iron and Steel Index	Volume of Carloadings Index	Volume of all Business Index
1929	322.4	144.4	142.7	109.6
1930	254.8	92.3	126.8	95.6
1931	179.2	51.7	104.6	81.7
1932	84.7	32.3	88.1	68.7
1933	55.8	56.5	81.3	69.6
1934	70.3	61.5	93.8	82.3
1935	95.7	90.2	95.1	89.4
1936	89.6	99.4	100.0	98.0
1937	113.0	117.0	105.8	107.2
1938	101.7	93.6	97.4	98.6
1939	100.0	99.7	101.5	106.9
1940	161.3	164.8	113.6	121.1
1941	178.3	220.1	128.8	135.6

(1) Statistics are compiled on a monthly basis in the "Monthly Review of Business Statistics" published by the Dominion Bureau of Statistics. The data used in this table are yearly averages. They have been supplied by the Business Statistics Branch of the Dominion Bureau of Statistics. Base: 1935 - 1939.

FIGURE XV.

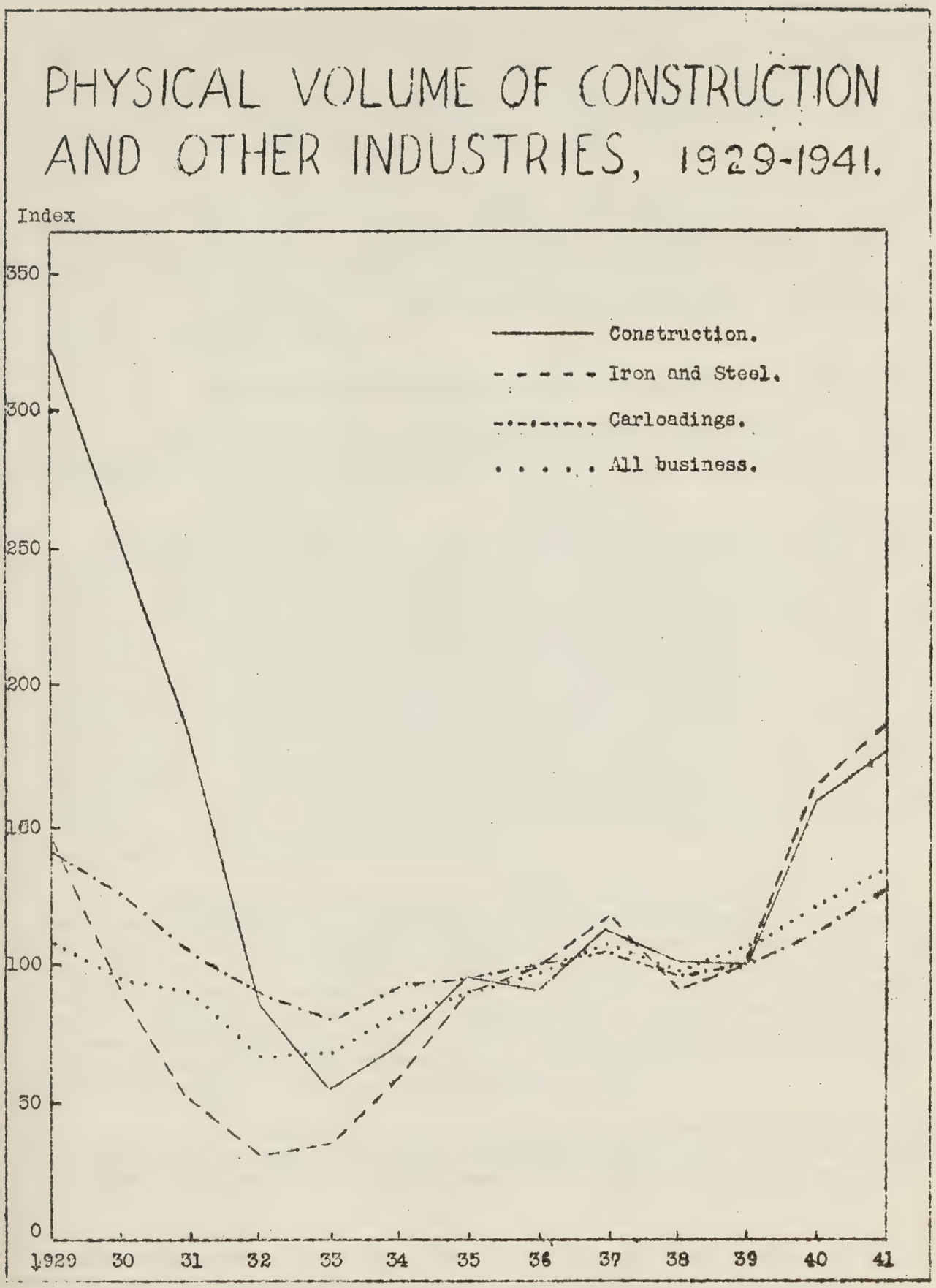

Chart showing a comparison of physical volume of construction with the physical volume of iron and steel, carloadings, and of all business (Index Numbers). Base: 1935-1939. For sources of statistics see previous table.

in the following the long-term of construction and the other industries analyzed has been determined in order to show the relative increase or decrease in the physical volume of these industries over a long period.

Table XXI shows the secular trend(1) of the physical volume of construction, iron and steel carloadings and all business for the period 1929-1941. The statistics contained in this table are illustrated in Figure XVI. The most outstanding feature of this chart is the fact that the long-term trend of construction and carloadings indicates clearly a steady decrease in the physical volume of these two indicators. The long-term trend of iron and steel and of the volume of all business shows an upward movement.

The downward movement of the long-term trend representing the physical volume of construction is of great importance in considering the role which construction might play in the post-war period. It appears from the above presentation that construction, if left to its own devices, would continue, in the long run, in a downward direction. It appears imperative, therefore, to take this long-term trend of construction into consideration when planning a post-war construction program.

2. Construction and the Other Eight Main Branches of Production.

Table XXII shows the gross value of production in nine main branches for the years 1929, 1933 and 1938. The data are taken from the "Survey of Production in Canada", annually published by the Dominion Bureau of Statistics.

The term "production" is used by the Dominion Bureau of Statistics "in its popular acceptance, i.e., as including such processes as the growing of crops, extraction of minerals, capture of fish, conversion of water power into electrical current, manufacturing, etc., - in economic phrase, the creation of 'form utilities'. It does not include various activities which are no less 'productive' in the broad and strictly economic sense, such as (a) transportation, refrigeration, merchandising, etc., which add to commodities already worked up into form the further utilities 'place', 'time' and 'possession', and (b) personal and professional services, such as those of the teacher and doctor, which are not concerned with commodities at all, but are not on that account any less useful to a civilized society, - representing, in economic language, the creation of 'service utilities'."(2) It is, therefore, of importance to remember that this comparison deals only with one section of economic activity and that no consideration is given to what has been termed the "commodity handling" and "facilitating" division.

Figure XVII illustrates the findings contained in Table XXII. We note that agriculture contributed 24.3 percent to the gross value of production in 1929, but only 23.8 percent in 1933 and 19.6 percent in 1938. On the other hand the importance of mining increased, its contribution rising from 5.4 percent in 1929 to 7.9 percent in 1933 and 12 percent in 1938. Construction contributed 8.8 percent to the total gross value of production in 1929, 6.1 percent in 1933 and 6.5 percent in 1938. The most stable contribution of one of the major branches of production was manufacturing with 47.1 percent in 1929, 46.5 percent in 1933 and 47.7 percent in 1938.

It is important to bear in mind that the above percentages show only the relative importance of the nine main branches of production within one year. They are not intended to show the increase or decrease in the volume of the

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(1) For the description of the method used by the Dominion Bureau of Statistics for the purpose of computing the secular trend, see "National Income of Canada 1919-1938", Part I, Ottawa 1941, pp 19 ff.

(2) Dominion Bureau of Statistics: "Survey of Production in Canada, 1939", Ottawa 1941, p.27.

TABLE XXI

THE SECULAR TREND OF THE PHYSICAL VOLUME OF CONSTRUCTION, IRON AND STEEL, CARLOADINGS AND ALL BUSINESS.(1)

1929 - 1941

Year	Volume of Construction Index	Volume of Iron and Steel Index	Volume of Carloadings Index	Volume of all Business Index
1929	148.7	83.4	116.9	84.4
1930	145.1	84.4	116.0	86.2
1931	141.4	85.3	115.1	87.9
1932	137.8	86.3	114.2	89.7
1933	134.2	87.2	113.2	91.4
1934	130.6	88.2	112.3	93.2
1935	126.9	89.1	111.4	94.9
1936	123.3	90.1	110.5	96.7
1937	119.7	91.0	109.6	98.4
1938	116.0	92.0	108.7	100.2
1939	112.4	92.9	107.8	101.9
1940	108.8	93.9	106.9	103.7
1941	105.2	94.8	105.9	105.4

(1) Statistics have been supplied by the Business Statistics Branch of the Dominion Bureau of Statistics. Base: 1935 - 1939.

FIGURE XVI.

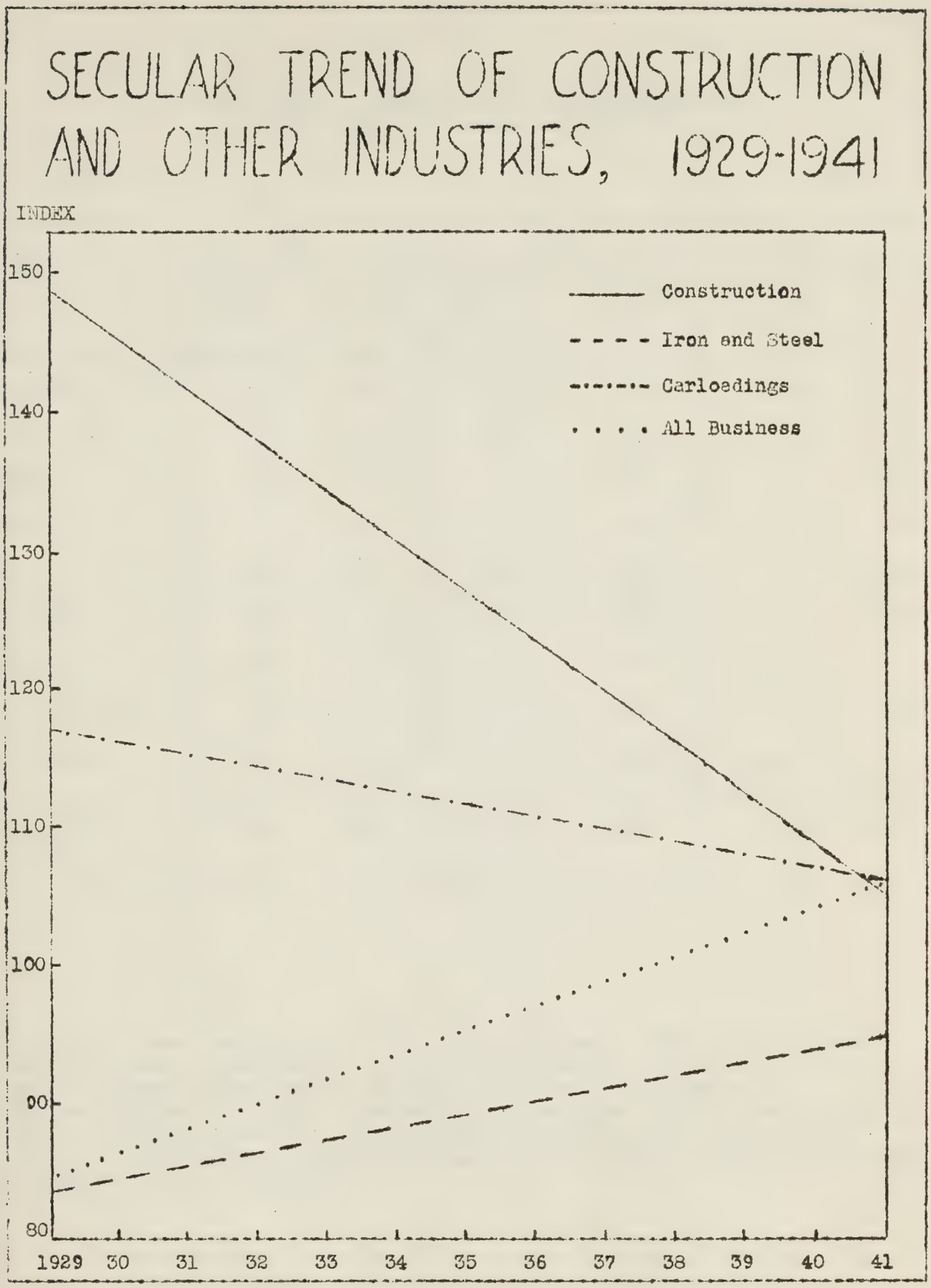

Chart showing a comparison of the secular trend of the physical volume of construction, iron and steel, carloadings, and all business (Index Numbers). Base: 1935-1939. For sources of statistics see previous table.

TABLE XXII

GROSS VALUE OF PRODUCTION IN NINE MAIN BRANCHES
FOR THE YEARS 1929, 1933 and 1938.(1)

Industry	1929		1933		1938	
	Million Dollars	Percent	Million Dollars	Percent	Million Dollars	Percent
Agriculture	1,631	24.3	805	23.8	1,063	19.6
Forestry	611	9.1	257	7.6	425	7.8
Fishing	71	1.1	36	1.1	53	1.0
Trapping	16	0.2	7	0.2	7	0.1
Mining	361	5.4	269	7.9	654	12.0
Electricity	123	1.8	118	3.5	144	2.6
Construction	591	8.8	208	6.1	353	6.5
Custom and Repair	145	2.2	113	3.3	146	2.7
Manufacturing	3,166	47.1	1,575	46.5	2,595	47.7
Total Gross Value of Production	6,714	100.0	3,387	100.0	5,440	100.0

(1) Data taken from "Survey of Production in Canada, 1939" published by the Dominion Bureau of Statistics, pp. 16-17. "Production" includes, according to the classification used by the Dominion Bureau of Statistics, the industries specified above. Transportation, communications and trade described as the "commodity handling division" and banking and finance, government activities, and service excluding custom and repair described as "facilitating division" are not considered.

FIGURE XVII

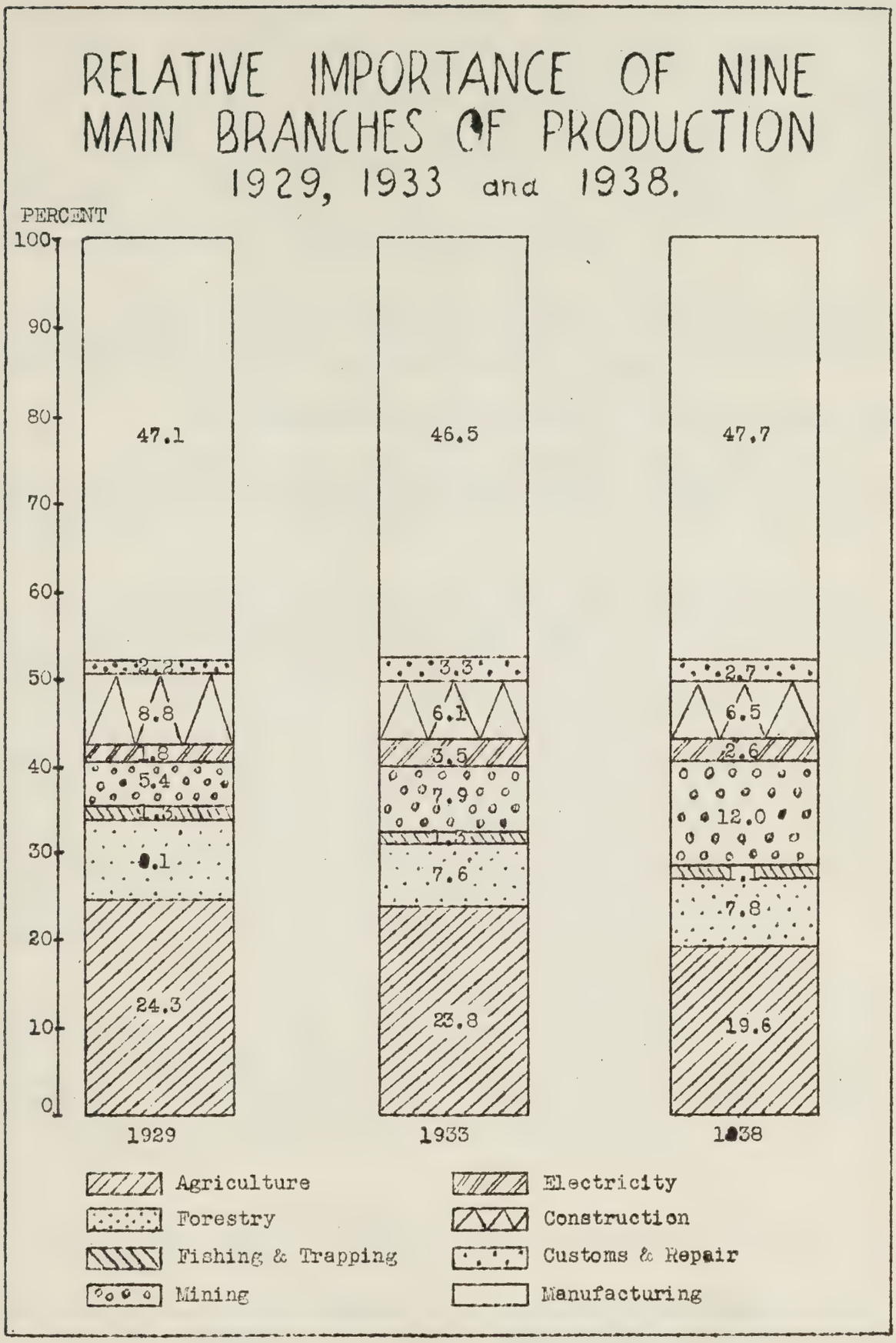

Chart showing the contributions of the nine main branches of production to the total gross value of production for the years 1929, 1933 and 1938. According to the classification used by the Dominion Bureau of Statistics "production" includes the industries specified above. The "commodity handling" and "facilitating" divisions of economic activity are not considered.

industries concerned. If we were interested in determining, for example, the relative decrease of agriculture and construction from 1929 to 1938, then we would have to consider the gross values of both industries for the two years. The gross value of agriculture, according to this Dominion Bureau of Statistics' estimate(1), amounted to $1,631,000,000 in 1929 and $1,063,000,000 in 1938, which indicates a decrease of approximately 35 percent from the 1929 level. The gross value of construction amounted to $591,000,000 in 1929 and $355,000,000 in 1938, a decrease of approximately 40 percent from the 1929 level. Mining, on the other hand, increased from $361,000,000 in 1929 to $654,000,000 in 1938, that is about 81 percent over the 1929 level. This comparison shows us again the marked fluctuations of construction, which are even greater than the fluctuations of agriculture.

There is hardly any doubt that great fluctuations of construction activity do not only cause disturbance within this industry but - though to a considerably smaller extent - also affect most of the other main branches of production mainly by diminishing requirements of construction material.

The Consequences of a Depression in Construction Industry

The fact that the construction industry suffers considerably in a period of depression has been emphasized repeatedly in this study. The affects of a sudden decline in the volume of construction activity may be summarized as follows.(2)

A considerable decrease in the volume of construction, such as experienced in the depression of the early thirties, causes considerable unemployment in construction proper and at the same time affects greatly the construction material supplying and transporting industries, since these industries depend on orders from the construction industry. The volume of these orders is greatly diminished in consequence of reduced construction activity. Furthermore, wage rates in the construction industry decline since, due to increased unemployment, there is a great supply of construction labour while the demand for it is small. In consequence of increased unemployment and lower wage rates, the resources at the disposal of the wage earners, which are mainly used for the purpose of acquiring consumer goods, are considerably diminished. The consequence is a reduction in the demand for consumer goods. This reduction causes serious repercussions not only in the consumer goods industries but even to a greater extent in the producer goods industries. These industries are forced to reduce their volume of production and additional unemployment is created.

We thus find that the decrease of the volume of construction from its normal level affects, as any other depressed producer goods industry would, the whole economy of the country. At the same time, however, the necessity for additional construction does not remain the same as in the previous period of prosperity. Population increases and thus additional requirements for residential buildings, roads and other facilities come into existence. These requirements are, however, only partly fulfilled. The consequence is a "backlog" in building and construction.

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(1) The figures analyzed in this section are tentative estimates by the Dominion Bureau of Statistics.

(2) When considering this summary it is important to bear in mind that what is being said about the construction industry, applies - though with varying degree - to a number of producer goods industries. The construction industry, which is considered to be a durable consumer goods industry, is affected in a depression like most of the producer goods industries. It is for this reason that construction industry is commonly counted among the producer goods industries.

The above summary gives only a rough sketch of the main aspects of the consequences of a drastic reduction in the volume of construction due to a depression.(1) Even this short presentation may make us realize the need for giving special consideration to the problem of how to assure a greater stability of the construction industry in the post-war period.

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(1) A number of other aspects of the problem, for example the importance of the "psychological factor" in a depression, are mentioned in Section VIII.

SECTION VII

SOME RELEVANT COMPARISONS WITH THE CONSTRUCTION INDUSTRY IN THE UNITED STATES.

While in some instances the trend of construction activity in Canada is similar to that in the United States, in others a great difference will be found in development or in the importance which building and construction has acquired for the national economy.

This section is primarily concerned with showing two things:

(1) The different contributions which building and construction have made to the national income in Canada and the United States.

(2) The different trends of building and construction activity in Canada and the United States during the period 1929-1938 which represents a major phase of the business cycle.

For the purpose of comparison the national income study prepared by the National Bureau of Economic Research in the United States has been used in this section. It might be said that, in addition to the national income estimates made by the National Bureau of Economic Research, there are also estimates made by the United States Department of Commerce. The study of the national income estimates of the National Bureau of Economic Research is contained in Simon Kuznets' book - "National Income and Its Composition, 1919 - 1938"[1].

In a broad way the Dominion Bureau of Statistics follows the methods used by the National Bureau of Economic Research in computing the national income. A comparison of these two national income estimates is, therefore, permissible.

As far as building and construction in the United States are concerned, there are not less than twenty-one Federal agencies actively interested in information on the construction industry and its related branches. The principal sources of information on the size and composition of the contract construction industry in the United States are the census of construction, the annual income tax tabulations of the Bureau of Internal Revenue, and the quarterly employer tabulations of the Social Security Board derived from information reported in connection with old-age and survivors' insurance.

The government agencies concerned with the compilation of data on construction have experienced similar difficulties as the Dominion Bureau of Statistics. Kuznets complains that the deficiencies of coverage in construction are serious. Many firms in contract construction have no clearly recognizable or identifiable location, and can easily be overlooked in any country-wide survey. He says that there are some contractors who have their offices "in their heads" and are operating a genuine business that is perhaps their sole source of income as well as that of a few employees. "Furthermore, high mortality, both secular and seasonal, is common among construction and trade units. Consequently, a census for a given year would necessarily miss the activity of the units that were seasonally idle when it was taken or no longer in existence. Finally, in view of the primitive methods of accounting prevailing among small tradesmen and construction contractors, the trustworthiness

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(1) Simon Kuznets assisted by Lillian Epstein and Elizabeth Jenks: "National Income and Its Composition, 1919 - 1938", New York 1941, 2 vols.

of the information collected is subject to considerable doubt". Kuznets also emphasizes that, although the business units omitted are small, their number may be large, and the consequent inefficiency in the coverage of all construction activity may be rather substantial. (1)

The most recent report in this field, entitled "Construction, Housing and Real Property", deals extensively with the necessity for additional and better coordinated information on building and construction needed to complete and clarify the picture. The following are the comments of this report on the incomplete statistical coverage of construction in the United States:

"The census of construction provides a wide range of data on establishments engaged in contract construction, covering such aspects as kind of business, legal form of organization, value of work performed, and employment and pay rolls. It has been impossible, however, to identify and to secure complete coverage of all establishments whose principal business is contract construction. For 1929, data were secured primarily from contracting establishments handling work amounting to $25,000 or more in that year. For 1935 and 1939, the lower limit was set at $500; but, at least for 1935, the coverage of the smaller establishments was seriously incomplete. Furthermore, the construction census covers an undetermined portion (though not all) of the contract construction done by establishments which are engaged principally in retail or wholesale trade or in services, and this construction has not been segregated in the census tabulations to provide information for the contract construction industry separately.

"The Bureau of Internal Revenue income tax tabulations provide information (a) for corporations which report their principal business as construction and (b) for individuals with a net income of $5,000 and over who similarly report their principal business as construction. For corporations, data are provided on number of corporations, income, principal receipts and deductions, and principal balance sheet items; for individuals, on number of businesses, total receipts, wages and salaries, and profit or loss. The limitation of the generally available tabulations for individuals to those with a net income of $5,000 or more and the lack of tabulation of partnership returns, result in serious incompleteness for the contract construction industry, where small unincorporated enterprises handle a relatively large proportion of the total business.

"The Social Security Board employer tabulations show the number of taxable employees of contract construction firms, and the amount of taxable wages paid. Firms with no employees, which may constitute as many as one-third of all firms in the industry, are not covered."(2)

Since both the "Report on the Construction Industry in Canada" and the United States "Census of Construction" do not cover completely the field of construction in their respective countries, a comparison of the results of both censuses will be possible provided we bear in mind that the statistical coverage made by these two reports will most probably differ.

Contributions of Construction and Building to the National Income in Canada and the United States.

We often hear the complaint made in Canada that the construction industry suffered severely in the depression years, that it has been a "neglected" industry and that even in the best years of prosperity no full use has been made of the potentialities in this industry. Similar complaints

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(1) Ibid., Vol. 1, pp. 105-6.

(2) Joan H. Williams "Construction, Housing and Real Property", a survey of available basic statistical data, Washington, June 1940, pp. 7-8.

have been made in the United States. It will therefore be of interest to compare the contribution which national income originating in construction contributed to the total national income in Canada and in the United States during the decade of 1929-1938, which covers the prosperity of 1929, the depression of the early thirties and the recovery towards the end of the thirties.

Table XXIII, on the following page, presents a comparison of national income originating in construction with total national income in Canada. This table has been compiled from data supplied by the Dominion Bureau of Statistics, It is important to bear in mind that "income originating in construction" refers only to that nucleus of construction which has been shown as circle 1,a in Figure I.

It will be seen that the highest contribution made by building and construction to the national income was in 1929 and 1930, amounting to 5.1% in both years. Its contribution then declined gradually, reaching the lowest point with 2.8% in 1934. Construction activity increased in 1935 and the following years, reaching 3.8% in 1938. The average contribution of building and construction to the national income in Canada for the decade 1929 - 1938 amounted to 3.8%.

The next table, XXIV, compiled from estimates made by the National Bureau of Economic Research, shows a comparison of national income originating in construction with total national income in the United States. The highest contribution during the period 1929 - 1938 made by building and construction to the national income in the United States occurred in 1929 when it amounted to 4.6%. This is 0.5% less than the contribution of building and construction to the national income in Canada during the same year. The lowest contribution in the United States was in 1933, when only 1.6% of the national income was due to the activity of the construction industry. Construction activity in the United States recovered from 1934 onwards, arriving at a ratio of 2.6% in 1938. The average contribution of building and construction to the national income during the decade 1929 - 1938 amounts to 2.8%.

Galbraith gives a short resume of the part which building and construction played since the depression in the early thirties, which is quoted in the following:

"Although, in the years from 1933 to 1938, the total volume of new construction expenditure, including work relief construction, was more than doubled, in the best year (1938) this total was only 60 percent of the pre-depression level. Excluding work relief, the total reached only 49 percent in the best year. Consequently, since 1930 our economy has been without one of the principal supports for the relatively high level of income and business activity which existed in the 1920's.

"Such recovery as has occurred in construction, however, has been due in large part to the manifold increase in Federal and federally-financed construction activities, which were carried on from PWA funds, regular Federal appropriations, and work relief appropriations. The total Federal construction expenditures averaged $1,630,000,000 annually from 1933 to 1938, compared with $188,000,000 from 1925 to 1929; this represented an increase between the two periods from less than 2 percent to 35 percent of all construction expenditures. Excluding work relief construction, Federal construction expenditure averaged $843,000,000 from 1933 to 1938. The dollar volume of State and local construction expenditure has shown no significant increase from the greatly depleted level of 1933 and, consequently, has acted as an important offset to the increase in Federal construction expenditure." (1)

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(1) J. K. Galbraith, assisted by G. G. Johnson, Jr.: "The Economic Effects of the Federal Public Works Expenditures, 1933-1938", National Resources Planning Board, Washington, 1940, p.108.

TABLE XXIII

COMPARISON OF NATIONAL INCOME ORIGINATING IN CONSTRUCTION WITH TOTAL NATIONAL INCOME IN CANADA

1929 - 1938

Year	National Income (1) Million Dollars	Income Originating in Construction (2) Million Dollars	Ratio Percent
1929	5,236,200	265,800	5.1
1930	4,413,420	226,300	5.1
1931	3,566,318	163,192 (3)	4.6
1932	2,793,025	113,518	4.1
1933	2,707,775	91,805	3.4
1934	3,133,887	88,506	2.8
1935	3,363,242	101,579	3.0
1936	3,830,649	115,004	3.0
1937	4,345,582	151,672	3.5
1938	4,290,963	153,174	3.6
Average 1929 - 1938			3.8

(1) Net National Income, revised figures for 1929-1938 supplied by the Dominion Bureau of Statistics as per September 1942. Since the revision of the National Income Estimate is not completed, there may be a further revision of these figures.

(2) Data for "National Income Originating in Construction" taken from "Operating Accounts of the Construction Industry, 1919-1939" (preliminary sheet), supplied by the Business Statistics Branch of the Dominion Bureau of Statistics as per September 1942.

(3) The Dominion Bureau of Statistics has, in its revised estimate, changed the components which make up gross revenue in construction for the years 1931-1933. This revision refers, however, only to construction work undertaken by general and trade contractors and sub-contractors. A revision for 1931-1933 of the preliminary estimate, which includes construction undertaken directly by the public authorities, is not available.

TABLE XXIV

COMPARISON OF NATIONAL INCOME ORIGINATING IN CONSTRUCTION WITH TOTAL NATIONAL INCOME IN THE UNITED STATES.(1)

1929 - 1938

Year	National Income Million Dollars	Income Originating in construction Million Dollars	Ratio Percent
1929	87,234	4,071	4.6
1930	77,319	3,486	4.5
1931	60,300	2,228	3.6
1932	42,932	1,102	2.5
1933	42,183	711	1.6
1934	49,548	844	1.7
1935	54,406	1,048	1.9
1936	62,864	1,557	2.4
1937	70,494	1,792	2.5
1938	65,461	1,703	2.6
		Average 1929 - 1938	2.8

(1) Data taken from estimates made by the National Bureau of Economic Research, New York. See also Simon Kuznets, assisted by Lillian Epstein and Elizabeth Jenks: "National Income and Its Composition, 1919-1938", New York, 1941, Vol. I, p. 137 and Vol. II, p. 642.

FIGURE XVIII

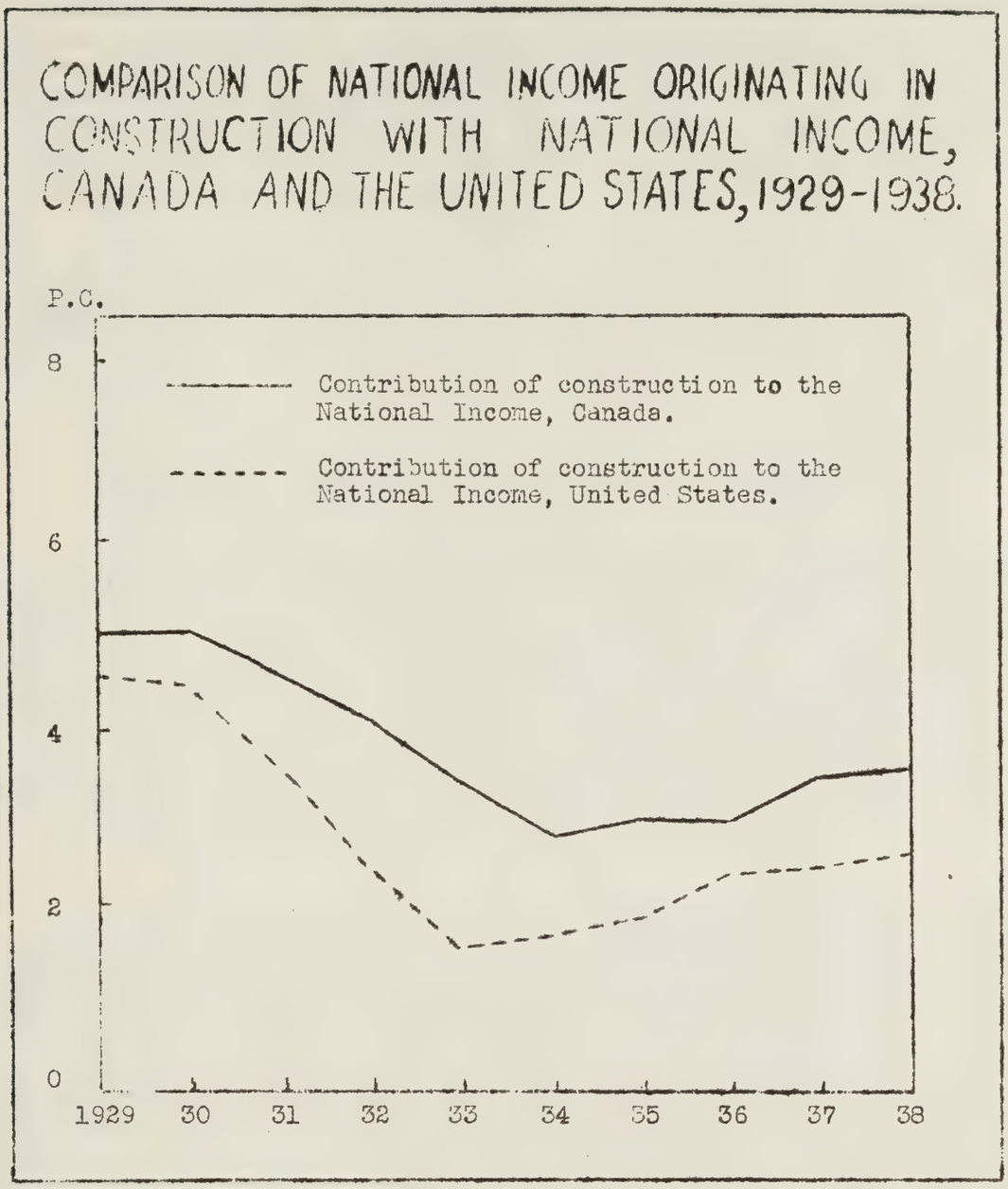

Chart showing a comparison of the annual contribution of construction to the national income in Canada and in the United States for the period 1929 - 1938. The two curves show the relative importance of construction for the Canadian and United States economies. For sources of statistics see tables on previous pages.

Returning to the contributions which building and construction have made to the national income in Canada and the United States, we find that the difference in the ratios of 2.8% for the United States and 3.8% for Canada is remarkable. It suggests that during the decade 1929-1938 building and construction contributed a greater share to the national income of Canada than its equivalent in the United States. There may be several reasons for this difference. It may be due to the fact that the manufacturing industries in the United States account for a greater share of the contribution to the national wealth than the same industries in Canada. It may be due to the fact that the number of industries in the United States are greater than in Canada and that each industry would thus contribute in proportion a smaller share to the national income than would otherwise be the case. It may also be due to the fact that Canada is, as far as development is concerned, a "newer" country than the United States. In this case it is quite reasonable to expect that building and construction plays a greater role in Canada.

An illustration of the different roles which building and construction played as contributors to the national income in Canada and the United States during 1929-1938 is given in the chart (Figure XVIII) which follows Table XXIV. The two curves drawn in the chart indicate the relative importance of building and construction for the Canadian and United States economies.

Trend of Income Originating in Construction and Total National Income in Canada and the United States.

In order to show the trend of income originating in construction and total national income in Canada and the United States during 1929-1938, an Index has been prepared by the writer. 1929 was taken as a base and was put equal to 100. The whole series of values contained in Tables XXIII and XXIV was adapted accordingly.(1) The presentation of these values (shown in Table XXV at the end of this section) in a time series as relatives, with reference to the fixed base of 1929, makes possible a ready comparison of the values and enables us to follow the trend of the series much more easily than when the data were presented in their original form. The comparison of the trends of two different series (Canada and the United States) is also facilitated.

The trend of the annual changes of total national income and income originating in building and construction is probably more clearly recognizable from Figure XIX than from Table XXV. This chart which follows Table XXV shows that during 1930 and 1931 the national income declined more rapidly in Canada than in the United States and that in 1932 and 1933 the national income in the United States declined more rapidly than the national income in Canada. Since 1934 the national income has been increasing in proportion at a greater pace in Canada than in the United States. In 1937 the proportionate increase of the national income in the United States reaches nearly the level of the Canadian increase. While the national income in Canada maintained about the same level in 1938 as in 1937, the national income in the United States showed a marked decrease in 1938 from its 1937 level.

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(1) It should be noted on this occasion that, so far as the United States are concerned, building and construction reached the peak in 1926 when their contribution to the national income of the United States amounted to $4,264,000,000, that is $193,000,000 more than in 1929. If 1926 had been taken as a base of the Index, the decline of the contribution of construction industry to the national income would have been somewhat more marked than on the basis of 1929.

A similar picture will be found in the trend which indicates the annual changes of income originating in construction in Canada and the United States. It is of interest to note that income originating in construction reached a far lower point in the United States in 1933 (the index figure is 17) than in Canada in 1934 (the index figure is 33).

The burden of this section is that in both countries there was a marked decline of the total national income and correspondingly the contributions of building and construction to the national income during the period 1929-1938. With the exception of 1930 and 1931 the national income in Canada decreased at a slower pace than in the United States. From 1934 onwards national income in Canada recovered at a faster pace than in the United States. The same phenomenon applies to income originating in construction in Canada and the United States. It means, in other words, that in relation to the 1929 level and as far as unadjusted dollar values indicate(1), Canada suffered less from the depression and reached, in its recovery, a higher point than the United States. This applies not only to the total national income but also to the contribution which building and construction made to national income.

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(1) It is probable that if the income figures were adjusted for changes in the price level (real income), they would show a less marked divergence between the two countries. The revised estimates of national income originating in construction which are available for construction work undertaken by private contractors only, seem to indicate that the divergence was in reality less extensive than it might appear from the two respective curves in Figure XIX. Even if these factors are taken into consideration, there still remains a remarkable difference between the contribution of construction to national income in Canada and in the United States.

TABLE XXV

INDICES OF NATIONAL INCOME ORIGINATING IN CONSTRUCTION AND NATIONAL INCOME IN CANADA AND THE UNITED STATES.(1)

1929 - 1938

Year	Index of National Income Canada (2)	Index of National Income United States (3)	Index of Income Originating in Construction Canada (4)	Index of Income Originating in Construction United States (5)
1929	100	100	100	100
1930	85	89	84	85
1931	68	69	60	54
1932	54	49	42	27
1933	52	48	34	17
1934	60	57	33	20
1935	65	63	37	25
1936	74	72	43	38
1937	83	81	56	44
1938	83	75	57	41

(1) Base of Index: 1929 = 100

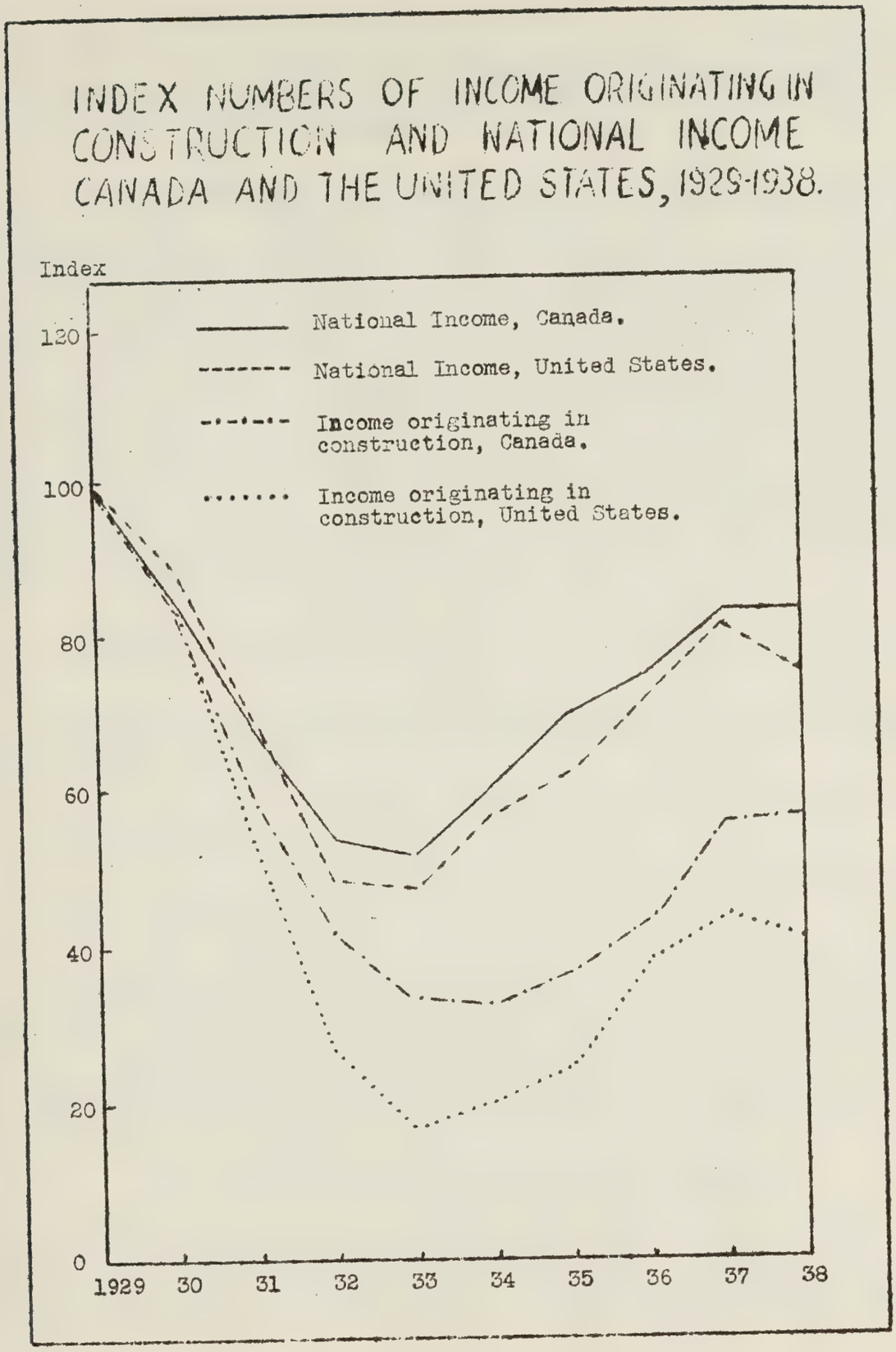
(2) National Income, revised figures for 1929-1938 supplied by the Dominion Bureau of Statistics as per September 1942.

(3) Simon Kuznets, assisted by Lillian Epstein and Elizabeth Jenks: "National Income and Its Composition, 1919-1938", New York, 1941, Vol. I, p. 137.

(4) Data for "National Income Originating in Construction" taken from "Operating Accounts of the Construction Industry, 1919-1939" (preliminary sheet) supplied by the Business Statistics Branch of the Dominion Bureau of Statistics as per September, 1942.

(5) Simon Kuznets, assisted by Lillian Epstein and Elizabeth Jenks: "National Income and Its Composition, 1919-1938", New York, 1941, Vol. II, p. 642.

FIGURE XIX



Index numbers indicating the annual percentage changes in total national income and income originating in construction, Canada and United States. Base of Index: 1929 - 100.

SECTION VIII

THE SECONDARY EFFECTS OF CONSTRUCTION.

In the previous sections a quantitative analysis has been given of the employment created by expenditure in the construction industries and in the construction material supplying and transporting industries described as direct and indirect employment respectively. The aggregate of the employment thus created has been called primary.

It is obvious that primary employment does not represent the total of employment created by construction expenditure. There are other effects of construction expenditure which we may call secondary effects. When a new house, bridge or road is built, additional expenditure will have to be made in the future for the purpose of maintaining these structures. For the purpose of completion of the houses built, there will also be required a number of appliances (furnaces, refrigerators, etc.). These houses will have to be furnished and a number of durable consumer goods industries will be affected (furniture, silverwares, rugs, etc.). Another important consideration of the effect of construction expenditure will be the fact that an increase in primary employment will put at the disposal of the persons engaged increased revenues, which they will use to a large extent for the purpose of buying consumer goods. In consequence the consumer goods industries will expand and create new employment in their own sphere as well as in the producer goods industries which provides them with the material and equipment required. Current literature calls this additional employment "secondary employment".

We might thus summarize the secondary effects of construction expenditure as follows:

(1) Additional employment created by the necessity to maintain structures. This type of employment is included under the heading "construction proper" in circle 1 of Figure I.

(2) Employment created in the appliance industries, which has been shown as circle 5 of Figure I.

(3) Employment created in the consumer goods industries shown as circles 6 and 7 of Figure I.

Bearing these qualifications in mind, let us now turn to a review of a selected number of opinions on the importance of construction activity in Canada, Great Britain and the United States. Most of these comments place some emphasis on the secondary effects of construction expenditure; but, on the whole, there is - except by economists - little distinction made between the effects of construction expenditure on the construction material supplying and transporting industries and all other industries affected by construction expenditure.

<u>Dr. W. C. Clark, the Deputy Minister of Finance.</u>

"Construction is one of the greatest of our capital or durable goods industries and it is the drastic fluctuations in this group of industries that largely account for the wide differences in general economic activity as between good and bad times. Purchases of consumer's goods maintain a fairly steady

volume, but the durable goods industries expand to extraordinary proportions during the boom period and lapse into comparative stagnation during the depression phases of the business cycle. Perhaps in no industry is the range of fluctuation apt to be so wide as in construction, although residential construction is usually more stable than other branches of the industry. The bad effects of this extreme variability on the general welfare can scarcely be exaggerated. The reason will be obvious if we examine the magnitude of the industry itself and of the long series of industries which produce its raw and processed materials -- lumber, iron and steel, cement, lime, brick, stone, glass, heating equipment, plumbing equipment, and a myriad of others; the very large number of skilled craftsmen and unskilled laborers to which it gives employment, both directly and indirectly; and the fact that its effects on business activity and employment ramify so widely through every town and hamlet throughout the country.

"As everyone knows, the construction industry has been the most laggard of our major industries in recovering from the great depression. During the pre-depression period of eleven years, from 1921 to 1931, the average annual value of all construction contracts awarded in Canada was slightly greater than $370,000,000 and the annual totals ranged from a low of $240,000,000 in 1921 to a high of $580,000,000 in 1929. During the worst year of the depression -- 1933 -- the total dropped to less than $100,000,000; a decline of 73 percent from the 10-year average. Even for the year 1936 contracts awarded aggregated only $163,000,000, and the annual average for the period 1932-36 was only $135,800,000, despite a very large amount of government construction. For the 10-year period 1921-31, the average annual volume of contracts awarded for residential purposes amounted to $104,000,000, the total varying from a low of $76,700,000 in 1921, to a high of $139,200,000 in 1928. In contrast with these figures we have an annual average of $32,500,000 for the last 5 years, a low of $23,900,000 during 1933, and a recovery to only $42,900,000 during 1936.

"It is little wonder that with building at so low a level, general business activity has been so depressed and unemployment has attained such proportions. Various inadequate surveys made in recent years have all indicated that a very large proportion of the total volume of unemployment was to be found in the construction trades and in the industries dependent upon them." Dr. Clark then continues to examine a "backlog" of residential construction which came into existence during the depression of the early thirties and concludes: "..., Even this theoretical calculation is sufficient to give some idea of the magnitude of the market to be exploited by an efficiently functioning construction industry and of the beneficial results to our economy which would result therefrom in increased employment and decreased relief expenditures, in expanding business activity, in a rising volume of traffic for our railroads, in improved governmental finances, in a lessened burden of real estate taxation, in decreasing social discontent, and in a general stimulation of our whole economic life. It was for this reason that Parliament has endeavoured through the Dominion Housing Act, 1935, and the Home Improvement Loans Guarantee Act, 1937, to provide an effective stimulus to the house-building industry." (1)

In considering Dr. Clark's analysis we have to bear in mind the qualifications made in Section I with reference to the usefulness of "contracts awarded" figures as an indicator for changes in the yearly volume of construction. We observe from Dr. Clark's statement that he lays great emphasis on the possible stimulating effects of construction expenditure for the Canadian economy provided an expansion of construction activity is properly planned and timed. Dr. Clark was one of the first governmental authorities pointing to the importance and the responsibility of an "efficiently functioning construction industry".

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(1) W. C. Clark: "Housing", Dalhousie University Bulletins on Public Affairs, No. VI, Halifax, 1938.

Conference of all National Organizations Interested in the Construction Industry, Toronto, 1933.

In February 1933 a conference of a number of organizations interested in construction took place. The following national bodies were represented:

The Royal Architectural Institute of Canada, Engineering Institute of Canada, Canadian Construction Association, Canadian Manufacturers Association, Canadian Chamber of Commerce, Canadian Lumbermen's Association, Brick Manufacturers Association, Canadian Council of International Society of Master Painters and Decorators, Canadian Founders and Metal Trades Association, Canadian Hardwood Bureau, Canadian Automatic Sprinkler Association, Contracting Plasterers Association of Canada, Electric Service League, Structural Clay Tile Association, Canadian Paint Oil and Varnish Association, Canadian Institute of Steel Construction, Trades and Labour Congress of Canada, and the Canadian Ceramic Society.

This conference presented a brief to the Prime Minister, the Right Honourable R.B. Bennett, on the necessity of stimulating construction activity in Canada. After describing the scope and the structure of the construction industry the following statement is made: "We have already pointed out the magnitude of the construction industry and its importance in the Dominion,(1) and we wish to augment the weight of this argument by calling attention to the well-known fact, that compared with all other industries, a dollar spent in the construction industry is diffused into more channels of industry than any other type of dollar spent".(2)

The Foundation Company of Canada, Limited. Montreal and Toronto

The Foundation Company of Canada, Limited, analyzed the effect of construction expenditure for a two and one-half million dollar project (3). This company published the following statement with regard to the primary and secondary effects of construction expenditure:

"What construction does to provide employment, revive business and stimulate returning prosperity is strikingly exemplified by the new addition to the rayon plant of Courtaulds (Canada) Limited at Cornwall, Ontario.

"Providing more than a million hours of labour directly on the building since last October and throughout the winter months, this undertaking has practically eliminated unemployment in the Cornwall vicinity. More than two million hours of labour have been provided indirectly throughout Canada in mines - quarries - forests - refineries - transportation systems - harbours and manufacturing plants.

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(1) It is claimed in this brief that about 370,000 persons were employed in the construction industry and the construction material supplying and transporting industries in 1929. In the light of the statistics compiled and estimates made in Section V it appears that the assumed figure of 370,000 is an understatement, if the total of direct and indirect employment is considered.

(2) "Conference of all national organizations interested in the construction industry", Toronto, February 1933: Brief to the Honourable R.B. Bennett, Prime Minister of Canada; pp. 2 and 3.

(3) This breakdown is discussed more fully in Section V.

From British Columbia to Nova Scotia, Canadians profited from this construction work.

"Construction can and does aid every part of the community".(1)

Nesbitt, Thomson and Company, Limited

In the publication "The Construction Industry in Canada" prepared by the Statistical Department of Nesbitt, Thomson & Company, Limited, the following reference is made with regard to the stimulating effects of construction activity in Canada:

"In addition to the benefit derived from the direct employment in the construction industry when operating under normal conditions, practically every part of our industrial world is stimulated by the demand for lumber, cement, steel, asbestos, brick, hardware, paint and a great many other building materials. This stimulating effect also extends to the manufacture of electrical equipment, furnaces, refrigerators, furniture, etc. and even the railroads are affected through the larger volume of freight movement. No other development can bring such widespread benefits to every phase of the country's economic life as can a return to normal conditions in the construction industry."(2)

W. D. Black, President of the
Otis-Fensom Elevator Co. Ltd.

Mr. Black emphasizes that the "welfare" of the construction industry was of great importance not only to the construction industry and the firms supplying construction materials but also "to the farmer as a market for his products and to the provider of services as a source of income". He also pointed out that "the following important durable goods industries are materially affected by conditions in the construction industry: lumber, iron and steel, clay, glass and stone products, mining, machinery, electric apparatus, furniture, rolling stock and agricultural implements".(3)

Mr. Black finds that practically every part of economic activity in this country is in one way or another affected by the construction expenditure. Mr. Black expresses the belief that a "solution of the National unemployment problem would be largely entailed in the resumption of a proper level of activity by the construction industry". This last statement by Mr. Black expresses rather great optimism as to the possibility of pulling out of a depression mainly by increasing construction expenditure. It has already been emphasized that construction is only one of a number of industries which can absorb readily savings and create new opportunities for employment. There is no justification for the belief that a depression can be cured mainly by increased construction expenditure. On the contrary the concentrated effort of all Canadian enterprise is required to bring about a recovery once a foundation is laid by assuring a return of confidence in business opportunities. There is, however, hardly any doubt that increased construction expenditure is a very good channel through which new blood can be instilled into a weakened economic body.

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(1) Statement of the Foundation Company of Canada, Limited in "The Financial Post", Toronto, May 12th, 1934.

(2) Nesbitt, Thomson & Company, Limited: "The Construction Industry in Canada", Montreal 1937, p. 1.

(3) W. D. Black: "Construction, the Joint in the Armour of Depression", 1934, p. 17.

The Northern Electric Company, Limited - Montreal

A publication entitled "Public Works Which Are Justified in the Present Crisis" has been edited by the Northern Electric Company, Limited of Montreal for the purpose of emphasizing the usefulness of construction of conduits. This publication is based on "Wise Spending and Wise Saving" an article by the late Sir Josiah Stamp, who was one of the leading British economists.(1) Sir Josiah advocated increased spending by individuals and by the public authorities as an essential step towards minimizing unemployment during the depression of the early thirties. A very suitable outlet for increased expenditure would be construction. The result of increased spending would, according to Sir Josiah, bring a revival of confidence, enabling new enterprises to pick up the accumulated savings. By using these, additional employment would be created.

Basing its analysis on the above article the Northern Electric Company, Limited proceeds to establish the following "yardstick" for public works expenditure:

(a) Does it provide a maximum use of labor, with as wide a diversification as possible in the classes of labour used when compared with other classes of public works?

(b) Will it be of benefit to a reasonable percentage of the community in which it is placed, or in other words, will it be a useful public utility?

(c) Is it a new and untried project, or is it an extension of an existing undertaking such as water main, sewer, underground conduit, paving, etc.?

(d) Will it be revenue producing, i.e., self-supporting, either wholly or in part?

(e) Will it create or cause further employment?

Thereafter the Northern Electric Company, Limited proceeds to show that the construction of conduits fulfills the requirements set out above. An analysis of direct and indirect labour provided by the construction of conduits is added. Reference is made to the secondary effects of the construction of conduits by emphasizing the maintenance work necessary and orders given to the appliance industries. The Northern Electric Company, Limited finds that in addition to direct and indirect employment, created by the construction of conduits, further employment is created which is probably greater than for any other type of public works:

"The completion of underground conduits on a street is followed by the installation of cables, lamp standards and other equipment, also by a certain amount of re-arranging of service wiring inside and outside of buildings in order to change the overhead to underground service. In the particular job analyzed ... there will be some 350 small wiring jobs required. Some further employment is afforded in the removal and salvage of the poles and overhead wires."(2)

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(1) Sir Josiah Stamp: "Wise Spending and Wise Saving", "Hoarding Means Deflation and Unemployment - Consumption Should be Stimulated", Barron's Weekly, November 21st, 1932, p. 20.

(2) The Northern Electric Company, Limited: "Public Works Which Are Justified In The Present Crisis", Montreal, February 1933, p. 7.

It is further emphasized in the above publication that a great range of occupations is affected by this particular type of construction activity. Distinction is made between supervising work, skilled and unskilled work and the following definitions are offered:

"Supervision and office covers the so-called 'white collar' wage earner and includes - engineers, draftsmen, office and time clerks, and superintendents. In the skilled labour class are included carpenters, masons, cement workers, foundry men, quarrymen, machine tenders, etc., whilst common labour, which is a large percentage in underground conduit construction, covers pick and shovel men, drivers and a percentage of semi-skilled type of workers."(1)

Although the pamphlet published by the Northern Electric Company, Limited deals only with one particular type of construction, it shows us the wide range of effects of construction expenditure for conduits.(2)

A. C. Jameson, the Editor of the Daily Commercial News and Building Record.

Mr. Jameson lays great emphasis in his "Notes on Construction For the Creation of Employment", to which the writer was kindly given access, on the fact that "a large proportion of all construction creates ... furthers opportunity for employment." He also points out that construction industry produces national assets by creating a great demand for qualified and skilled men. Mr. Jameson states that "the Construction Industry comprises in addition to skilled and unskilled field and shop labour, several thousand general and trade contractors all with appreciable investments in plant and equipment, together with the entire architectural profession and a large part of the engineering profession. Like the architect or the engineer, the building trades mechanic spends a number of years - usually at least four - as an apprentice, acquiring a knowledge of his craft. This skill represents an important asset."(3)

The last statement by Mr. Jameson that it is also important to consider the reserve of skilled and trained men created by the employment in the construction industry, brings out an interesting point. It is evident that the knowledge and skill which men engaged in the construction industry acquire, is a definite asset for the country. A greater degree of skill and knowledge is required from persons engaged in building and construction than from persons employed in the other producer goods industries. Since it takes a number of years to acquire the knowledge and skill required for qualified persons desiring to engage in building and construction, the reserve of qualified and skilled men in this industry, available in the post-war period, may become an important factor in determining the scope of a construction programme.

The New York Trust Company

The role of construction industry as one of the most important capital goods producing industries and the wide range of effect of construction expenditure is emphasized with reference to conditions in the United States in an article entitled "The Construction Industry, Its Depression Record and Present Status":

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(1) Ibid. pp. 6-7.

(2) The figures for direct and indirect labour published in the pamphlet are out-dated. Arrangements are being made to obtain a more up-to-date breakdown of conduits' construction costs.

(3) A. C. Jameson: "Notes on Construction For the Creation of Employment", Toronto, September, 1942.

"In national progress toward recovery, the important role played by industries producing capital goods has long been recognized in informed quarters ... One of the most important outlets for capital goods is the building construction industry. In 1930, it took approximately 17.8 percent of the finished steel manufactured in this country, which was a greater quantity than any other industry, and an estimated 55 percent of the manufactured lumber. In addition, building construction consumes vast quantities of cement, stone products, brick and clay, copper, lead, zinc, paint, glass and innumerable other products. The ramifications of any marked contraction in building are consequently widespread, and pronounced inactivity in new construction affects scores of other industries."(1)

This article concludes that it is because of these considerations that a depression in construction must cause primary concern to all those concerned with the economic welfare of a country.

The Guaranty Trust Company of New York

The importance which construction activity can achieve for a country is described in an article which brings out the different trend of building and construction in Great Britain and in the United States during the depression of the early thirties. The Guaranty Trust Company of New York describes the conditions of construction industry in an article entitled "Building and Business Recovery in Great Britain and the United States" in the following way:

"In a comparison of the revival of general business in Great Britain and the United States in recent years, no point of difference stands out more conspicuously than the much greater influence that the building industry has had on British recovery. It is interesting to observe the building boom in Great Britain with a view to ascertaining the manner in which a similar building revival might stimulate business recovery in this country. The importance of the building industry in this country is illustrated by the fact that during 1930 it directly employed two and a half million individuals, while it is estimated that three and a half million more were indirectly dependent on construction for a livelihood. ..."

"The London Economist has stated that the building boom accounted for nearly one-fourth of the total rise in employment between 1932 and 1935. The British Minister of Health, Sir Kingsley Wood, recently announced that since the end of the war three million homes have been built in the country. It is significant that only about 15 percent of these homes were erected with government assistance, and the Minister holds that this privately financed building boom has been the greatest single force working toward recovery in England during the last few years. ..."

"There is much to substantiate the view that the leading contribution to British recovery has been the unprecedented spurt in residential construction activity. Business revivals in our own country have usually been either preceded or accompanied by an upturn in building, and once the upward movement commenced it has usually proceeded at a rapid rate. As the downward course of business approaches its low point and the momentum of the decline ceases, some one economic force usually turns upward, giving to industries directly and indirectly related the stimulation that is needed for them to participate in the process of revival. Construction has frequently provided this impetus."(2)

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(1) The New York Trust Company: "The Index", June 1934, Volume XIV, No. 6, p.116.

(2) Guaranty Trust Company of New York: "Building and Business Recovery in Great Britain and in the United States", published in "The Guaranty Survey", New York, September 28th, 1936, Volume XVI, No. 6, pp. 1-2.

The Guaranty Trust Company comes to the conclusion from its comparison of conditions in Great Britain and the United States that the "construction industry in the United States has not played an important part in bringing about recovery" from the depression in the early thirties. According to the opinion expressed in the above article construction industry "could and should exert great influence" in a business revival. "A full measure of prosperity cannot be achieved as long as such an important branch of industry lags."(1)

The United States Department of Labour

The United States Department of Labour summarizes the importance of secondary employment created by public works expenditure in its analysis of "P.W.A. and Industry, A Four Year Study of Regenerative Employment", as follows:

"The creation of pay rolls because of this direct employment(2) had obvious secondary benefits. Workers previously without jobs can devote pay checks to the purchase of necessities hitherto denied their families. New clothing is purchased, furniture and household equipment bought, medical care previously postponed is obtained. Families can enjoy a more ample board. Buying power is put into action.

"This has a direct effect on merchants who sell to the reemployed workers. If their business improves measurably, they are enabled to put on additional help. As their shelves are cleared of old stocks, new goods must be supplied. Here consumers' goods industries enter the picture. With renewed orders, they may have to augment their employment, held down during lean years. An enlarged demand for raw materials is felt.

"It is obviously impossible to calculate the entire effects of the stimulus given by employment created on a project. However, secondary benefits do exist, and they add their force toward general economic stimulation."(3)

This statement as to the effects of secondary employment is explained somewhat more in detail in the following summary.

National Resources Planning Board - Washington

"The Economic Effects of the Federal Public Works Expenditures, 1933-1938", a report prepared by J. K. Galbraith and others for the Public Works

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(1) Ibid., p. 1.

(2) This study of the Department of Labour is concerned with off-site and on-site employment created by public works carried out by the Public Works Administration during 1933 to 1937. The term "direct employment" is used in this connection to include employment created by carrying out public works on the spot and employment created in the material supplying and transporting industries. The use of the term "direct employment" for the purpose of indicating the aggregate of on-site and off-site employment is an example of the diverse use of this term. It appears that a more uniform use of the terms "direct" and "indirect" employment, "off-site" and "on-site" employment, "primary" and "secondary" employment, would be highly desirable.

(3) United States Department of Labour: "P.W.A. and Industry, A Four Year Study of Regenerative Employment", Washington, 1938, p. 12.

Committee, National Resources Planning Board, analyzes to quite some extent the problem of the secondary effects of public works. The principles applying to the secondary effects of public works are not restricted to this section of construction only but are valid also for the aggregate of all construction be it private or public.

Galbraith explains in his study that it is of great importance to consider in addition to "the amount of employment provided on the site of the project and in supplying it with materials, and with the amount of business created on the construction job and in the construction supply industries", the secondary or "unidentifiable effects" of construction expenditure. Workers employed on construction projects have incomes to spend which they would not otherwise have, or their incomes are at least increased over what they would otherwise be. The same is true of workers who are employed in the supply and transportation of construction materials. Contractors and concerns furnishing materials have added revenues at their disposal. Galbraith summarizes thus the secondary effects of construction expenditure:(1)

"The further effect on employment of the spending and respending of these incomes is generally recognized, although there has been much controversy over its extent and the promptness with which it makes itself felt. Some have dismissed this secondary effect as diffused over time or largely hypothetical; others have added together slowly diminishing series of respendings at weekly or monthly intervals and have concluded that a phenomenally large employment must result from phenomenally small additions to the stream of income.

"Unfortunately, none of the actual studies of the problem provides a wholly satisfactory answer,.....there is, as a matter of fact, some doubt whether a figure for secondary employment and income can be arrived at in view of the numerous factors acting to change its value from one period of time to the next. An approach to the problem, in any case, will require detailed field studies which trace the enhanced course of spending in actual cases through and across retail and wholesale enterprise and to the production of goods with determination at each stage of its effect on employment. This would be a lengthy and costly task, and it might also be an inconclusive one.

"In the light of the discussion of the problem in recent years and the experience during the same period there are, however, some significant generalizations to be made on the problem. It is clear, to begin, that the secondary effects of increased employment must not be exaggerated. It is easy to conjure up pictures of the workers employing the baker, the baker the barber, the barber the butcher, and so forth, but these pictures invariably ignore some extremely important variables. Restricting attention for the time being to the effect of increased employment on further employment, there are some important leakages and lags to be considered. Under conditions of general unemployment, the worker who finds employment on a (construction) project does, in most cases, have an increased income to expend. The amount of his pay check will not always be a net addition to his expenditures, however, for he was managing to live in some fashion before. If he were drawing on reserves (or) going into debt,....,these amounts must be deducted from his new wages to get at the net increase in his spending, and there must be partial deductions if he were living on charity or drawing on friends and relatives. If, with employment, he undertakes to retire debt or accumulate some reserve, there must be a further adjustment. This latter effect may be discounted somewhat, for if unemployment has continued for some time the pressure of sheer subsistence needs, including such items as depleted clothing inventories, will be great. There will be a tendency here, how strong one cannot tell, for full expenditure of all the increased income that can be released.

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(1) A few words have been inserted in the text in order to make the text more clear to the reader. The words inserted are in brackets.

"The situation in the areas where the worker spends his income is important, and the picture here is somewhat clearer. If it is a time of general unemployment, we are certain to have excess capacity, not only of the plant for producing and distributing goods or services, but in some degree of employed personnel as well. The obvious case here is when the net increase in the worker's spending comes to the retail store. This industry, during depression, does not readjust its personnel downward to accord closely with shrinking business(1) and increasing business does not necessarily involve any corresponding expansion of employment. No doubt a similar situation holds for the wholesale distributive trades and perhaps also for transportation. The incidence of the increased expenditure of the worker in the second instance is on increased income for the distributive trades and perhaps also for transportation. The incidence of the increased expenditure of the worker in the second instance is on increased income for the distributors, where debt retirement and the low spending rate of profits may neutralize its further effect, and only then upon increased demand for goods. At certain times inventory changes, and for some classes of goods, price changes, may delay or neutralize the transfer of increased goods demand into increased employment demand. All of these effects are possible, in fact probable, under conditions of general unemployment.

"This discussion is concerned with an increase in (construction) expenditure and employment during a period of general unemployment. It is apparent that the immediate effect on employment of the respending of increased incomes can be relatively small. However, if the reemployment be continued over a period of time, the situation will change somewhat. Accumulated debts of the worker will be repaid, some minimum cash reserve may perhaps be built up, and at some stage inventories will be reduced to normal or below, and inventory replacement will begin. The longer effect of reemployment itself is to clear away some of the obstacles to secondary employment, which, it is to be noted, must always be cleared away by some means before employment can be expanded. Over the longer period the effect of increased public works employment on total employment will certainly be different, and probably greater, than the immediate effect. Under any circumstances it is certain that a considerable amount of play must be expected between the provision of the primary employment and the realization of the secondary employment.

"The second observation, which follows partly from the above, is that both the initial and eventual volume of secondary employment will vary considerably under different conditions, in particular with the stage of the cycle. The factors making for this variation seem to have been far too heavily discounted by those who have sought for the value of the employment or investment multiplier. As just noted, if unemployment is high and has persisted for some little time, if inventories are high and there is general excess capacity in the distributive fields, there need initially be little or no secondary employment. The worker uses some of his increased income to catch up on his back rent or to stay the importunities of a loan shark, and the rest moves some of the excess stocks of retailers, who in turn pay off some debt. While conditions are improved for the future, there is no secondary employment or (in broad definition) investment as the immediate result of the primary expenditure. If, on the other hand, the worker is free of debt and his position generally secure, and if inventories are promptly replaced and retail trade is moderately active, conditions will be different. The enhanced income will be promptly spent in the goods markets; the replacing of inventories will be reflected in increased industrial employment; and increased employment in transportation and distributive trades is a possibility. In a still more favorable

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(1) The situation is obvious for "one-man" retailing enterprises. Undoubtedly it holds widely over the field of retailing.

situation, the replacement of inventories which are being depleted at a more rapid rate than before will have a multiplying effect on employment in consumers' goods industries, with a further multiplying effect on capital goods industries if this causes increased investment by producers of consumer's goods.(1) Under such circumstances the neutralizing effect of price increases and profit expansion will be greater than when activity is at a lower level, but secondary employment from the respending of the enhanced income (or directly induced by it) will be far in excess of the primary employment.

"To conclude, the volume of secondary employment associated with any given volume of primary employment is a variable with two dimensions of change. The initial effects of an increase in employment will be different from (and probably less than) the effects of enhanced employment over a period of years. In either case, the volume of secondary employment will vary with the volume of unemployment, the atmosphere of security or insecurity, and the volume of excess capacity in the economy. In other words it will alter with the long-run employment situation and with the stage of the business cycle. This variation suggests the illusory character of any effort to reduce the problem of secondary employment to strict quantitative terms."(2)

Galbraith's presentation of the secondary employment problem has to be supplemented only in a few points. The secondary effects of a given volume of expenditures upon consumption are in the current economic literature usually discussed under the term "Multiplier Principle". The Multiplier Principle is concerned exclusively with the effect of an initial expenditure on consumption and is, as Mr. Alvin H. Hansen puts it, "peculiarly concerned with the effect of such expenditures upon the receipt of wages, salaries, and dividends". In the following, a comment by Mr. Hansen on the secondary employment problem is given.

Alvin H. Hansen

Mr. Hansen discusses in his book "Fiscal Policy and Business Cycles" the secondary employment created by the expenditure of $1,000,000,000. With reference to the Multiplier Principle and in explaining the effect of the initial expenditure on consumption and the creation of secondary employment, he makes the following statements:

"The enlarged income of individuals flowing from the governmental expenditure and public works--the increased income in wages, salaries, and dividends--is not all used for consumption expenditures. The part that is not expended on consumption goods is saved. Such savings may be used either to pay off debt, held in idle balances, or used for financial investment in mortgages, securities, life insurance policies, and the like. It may, of course, be true that in certain cases the individual will directly expend his savings on real investment in a house, farm equipment, or other investment goods. In this latter case ... such an individual is performing a dual function. On the one side, he is saving a part of the income and, on the other side, he is simultaneously

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(1) The operation, in other words, of what has been called the "relation" of technical economic analysis.

(2) J. K. Galbraith, assisted by G. G. Johnson, Jr.: "The Economic Effects of the Federal Public Works Expenditures, 1933-1938", a report prepared for the Public Works Committee, National Resources Planning Board, Washington, 1940, pp. 116-117.

making a purchase of real investment goods."(1)

Summarizing, Mr. Hansen finds that "the initial billion dollars of private investment or government outlays on public works does not all eventuate in consumption expenditures. A part is drained off directly by the entrepreneurial units engaged in the productive process in debt payments and in idle balances, and a part of that paid out to wage earners, salaried employees, and dividend recipients is saved. Thus leakages, whether in the form of debt cancellation, the hoarding of idle balances, or financial investment, occur down the entire line of business units and individuals engaged in the private investment or public works project. The magnitude of these leakages determines, in the final analysis, what the secondary effects of the initial expenditures will be upon the volume of consumption expenditures." Mr. Hansen then continues:

"The ultimate effects of the initial billion-dollar investment or public works expenditures upon consumption, of course, do not stop at the stage we have reached in our analysis. The individuals participating in the private investment or public works project decide to spend a portion of the new income they have received in consumption purchases. Thus, we have reached the first stage in tracing out the secondary consequences of investment or public works expenditure upon consumption. The expenditures made on consumption goods now set in motion a new productive process necessary to supply these consumption goods. The funds thus expended again seep down through an entire productive process. Again, a part is not paid to wage and salary earners or dividend recipients, but is sidetracked in the form of debt cancellation and idle balances; and, again, a part of the income received by wage and salary earners and dividend recipients is shunted off into savings and utilized for repayment of debt, held in idle balances, or used for financial investment.

"This process continues indefinitely into the future ... each consumption expenditure being smaller than the preceding volume of purchases by the amount of leakages involved.

"What these leakages actually are in any given situation can, of course, be determined only by statistical investigation, though certain a priori judgments may be made with respect to their probable quantitative importance. Keynes has assumed that in England the leakages in a period of relative depression probably amount to 50 percent, so that each successive expenditure is 50 percent lower than the preceding one. J. M. Clark has argued that under American conditions the leakages are probably 33 1/3 percent, so that each successive expenditure is two thirds of the preceding one. This was also the rough guess of Keynes with respect to American conditions."(2)

Although the above estimates by J. M. Keynes and J. M. Clark on the size of "leakages in a period of relative depression" are rough guesses only, they might suffice to make us realize the limitation of secondary employment created by an initial construction expenditure. Bearing these estimates in mind we will avoid committing the mistake of contributing a "phenominally large employment" resulting "from phenominally small additions to the stream of income".(3)

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(1) Alvin H. Hansen: "Fiscal Policy and Business Cycles", New York, 1941, pp. 266-267.

(2) Ibid., pp. 267-268.

(3) J. K. Galbraith, assisted by G. G. Johnson, Jr.: "The Economic Effects of the Federal Public Works Expenditures, 1933-1938", a report prepared for the Public Works Committee, National Resources Planning Board, Washington, 1940, p. 116.

In this connection it might be of interest to present an estimate on the size of secondary employment created by a certain initial public expenditure. Such estimates, which raised a great controversy, were made by Mr. Keynes in 1933.

John Maynard Keynes

In his book "The Means to Prosperity", Keynes endeavours to make a quantitative analysis of the effects of an initial public works expenditure on secondary employment in the following way:

"The reluctance to support schemes of capital development at home as a means to restore prosperity is generally based on two grounds -- the meagreness of the employment created by the expenditure of a given sum, and the strain on national and local budgets of the subsidies which such schemes usually require. These are quantitative questions not easily answered with precision. But I will endeavour to give reasons for the belief that the answers to both of them are much more favourable than is commonly supposed.

"It is often said that it costs £500 capital expenditure on public works to give one man employment for a year. This is based on the amount of labour directly employed on the spot. But it is easy to see that the materials used and the transport required also give employment. If we allow for this, as we should, the capital expenditure per man-year of additional employment is usually estimated, in the case of building for example, at £200.

"But if the new expenditure is additional and not merely in substitution for other expenditure, the increase of employment does not stop there. The additional wages and other incomes paid out are spent on additional purchases, which in turn lead to further employment. If the resources of the country were already fully employed, these additional purchases would be mainly reflected in higher prices and increased imports. But in present circumstances this would be true of only a small proportion of the additional consumption, since the greater part of it could be provided without much change of price by home resources which are at present unemployed. Moreover, in so far as the increased demand for food, resulting from the increased purchasing power of the working classes, served either to raise the prices or to increase the sales of the output of primary producers at home and abroad, we should to-day positively welcome it. It would be much better to raise the price of farm products by increasing the demand for them than by artificially restricting their supply.

"Nor have we yet reached the end. The newly employed who supply the increased purchases of those employed on the new capital works will, in their turn, spend more, thus adding to the employment of others; and so on. Some enthusiasts, perceiving the fact of these repercussions, have greatly exaggerated the total result, and have even supposed that the amount of new employment thus created is only limited by the necessary intervals between the receipt of expenditure of income, in other words by the velocity of circulation of money. Unfortunately it is not quite as good as that. For at each stage there is, so to speak, a certain proportion of leakage. At each stage a certain proportion of the increased income is not passed on in increased employment. Some part will be saved by the recipients; some part raises prices and so diminishes consumption elsewhere, except in so far as producers spend their increased profits; some part will be spent on imports; some part is merely a substitution for expenditure previously made out of the dole or private charity or personal savings; and some part may reach the Exchequer without relieving the taxpayer to an equal extent. Thus in order to sum the net effect on employment of the series of repercussions, it is necessary to make reasonable assumptions as to the proportion lost in each of these ways."(1)

(1) J. M. Keynes: "The Means to Prosperity", London, 1933, pp. 9-11.

Mr. Keynes then continues to estimate the "employment multiplier", a figure measuring "the ratio of the increment of total employment which is associated with a given increment of primary employment in the investment industries".(1) In other words, the employment multiplier enables us to determine the aggregate of primary and secondary employment. He says:

"My own estimate, taking very conservative figures in the light of present circumstances, makes the multiplier to be at least 2 .... Since, however, I am anxious not to overstate what will be a sufficiently striking conclusion anyhow, let us take it at 1½, i.e. that two men employed by loan-expenditure lead indirectly to the employment, not of two further men, which represents my own belief, but of one further man. I do not think that anyone who goes through the detailed calculation can bring it out at less than this; which means that additional loan-expenditure of £200 on materials, transport, and direct employment puts, not one man to work for a year, but -- taking account of the whole series of repercussions -- one and a half men."(2)

Mr. Keynes' own estimate that a certain amount of expenditure creating primary employment would cause a secondary employment either one-half its size or the same size (two men employed in primary industries creating employment for one or two men in secondary industries) indicates the wide range of possible secondary employment created by an initial expenditure. It appears, however, that the range of secondary employment is far greater than it might be concluded from Mr. Keynes' statements. There are a number of forces at work which determine the relationship of primary and secondary employment. The latter may be, under certain circumstances, practically nil while under different conditions it may be more than the employment created in primary industries, the employment multiplier being smaller than one or greater than two.

Mr. Galbraith quite rightly points out that the volume of secondary employment will vary with the volume of unemployment, the atmosphere of security or insecurity and the volume of excess capacity in the economy. Experience proves that a small increase of expenditure creating some primary employment will affect secondary employment very slightly. Assumed that an initial outlay of $50,000,000 is made for construction or other purposes, the primary employment thus created will cause a comparatively small secondary employment. Let us describe the volume of secondary employment thus created as x. If the initial expenditure is increased tenfold to $500,000,000 the volume of secondary employment will not be 10x but will probably be greater than 10x simply because the tenfold increased expenditure for construction or other purposes makes itself much more felt throughout the country and brings a number of factors contributing to economic recovery into operation (e.g. return of an atmosphere of confidence in business). This does not happen if the initial outlay is comparatively small. The effect of primary employment upon secondary employment will depend to a great extent on what has been called "the timing factor". The timing factor related to construction expenditure means that it is essential to introduce a construction program at a time when the country is going to derive the greatest benefits from the execution of this program. It is clear that the construction program will affect Canada's economy differently depending on whether it is undertaken during the depression phase of a business cycle, at the turning point from depression to prosperity or during the period of recovery after the lowest point in a depression has been passed. It is evident that increased expenditure for construction and other purposes at the beginning of a depression might avoid coming to that low point which the business cycle would have reached had there been no increased expenditure for construction or other

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(1) J. M. Keynes: "The General Theory of Employment, Interest and Money", London, 1936, p. 115.

(2) J. M. Keynes: "The Means to Prosperity", London, 1933, pp. 11-12.

purposes. It appears, further, that the same expenditure made at a later time when the lowest point of the business cycle has been reached, will still cause a certain amount of secondary employment but the effects of expenditure made at this time will not be the same as those caused by expenditure at the beginning of the depression. Should, however, the expenditure take place after the lowest point in the business cycle has been reached, the secondary employment caused by it will again differ in volume from that caused by expenditure made at the lowest point of the business cycle. It is quite reasonable to assume that in this case the secondary effects of expenditure for construction or other purposes will be considerably smaller than if the expenditure had been made during the downswing of the business cycle. The public works authorities in the United States have come to similar conclusions basing their judgment on experience with public works expenditure from 1933 onwards.

This short description of the different range of the volume of secondary employment caused by a given volume of primary employment shows us the importance of the timing factor. This is one of the main reasons why plans for post-war construction projects and other projects contributing to the economic welfare of the country have to be made well ahead of time so that they can be put into effect when it appears to be to the best advantage of the country.

It has been pointed out that the "atmosphere of security or insecurity" affects greatly the volume of secondary employment caused by a certain amount of primary employment due to an initial expenditure. This factor is sometimes described as the "psychological factor". It means that the phases of the business cycle are not only determined by economic forces but also by factors inherent in human nature. Keynes finds "that a large proportion of our positive activities depend on spontaneous optimism rather than on a mathematical expectation" due to the "instability...of human nature".(1) What is happening during a period of depression is simply this. Business is reduced not only because of the weakened economic conditions of the country but also because of great pessimism in business opportunities which suddenly descends on those responsible for business enterprises. It is mainly for this reason that Keynes emphasizes that the economic prosperity of a country is "excessively depending on a political and social atmosphere which is congenial to the average business man".(2)

It has been emphasized throughout this study that construction industry is neither the sole source of the prosperity of a country nor can increased expenditure for construction purposes alone solve the unemployment problem which a country might be facing, as some optimistic people are inclined to believe. It has been mentioned that construction industry deserves special consideration, however, as a means of assisting a weakened economy to pull out of a depression or to reduce the hardships which a depression might bring upon a country. The following two points may explain, to some extent, the merits of the construction industry in addition to the fact that it creates durable assets:

(a) Although, compared with the total labour potential of Canada, construction expenditure provides direct and indirect employment for a relatively small group, it nevertheless affects a great number of trades and a wide range of gainfully occupied persons in practically every part of the country.

(b) Construction is one of the most visible economic activities for the public eye. If a considerable increase of construction activity takes place throughout the country, it brings

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(1) J. M. Keynes: "The General Theory of Employment, Interest and Money", London, 1936, p. 161.

(2) Ibid., p. 162.

clearly before the public the fact that we are travelling on a road towards a betterment of economic conditions. These visible effects of construction expenditure definitely assist in bringing back confidence in business which is so important for a well functioning economic organism.

In conclusion it may be said that a properly organized construction industry can make an important contribution to the post war economy if plans for construction projects have been carefully chosen and well prepared ahead of time. It bears emphasis that construction expenditures are of far greater potency if applied at a time when there are signs of an approaching depression rather than at the time when a depression has reached its lowest point. To use a simile, it is wise to buy an umbrella when lightning shows on the sky rather than after we have been drenched by the downpour. Construction industry alone, however big it may grow, cannot solve the unemployment problem which Canada may have to face after the conclusion of the present war. It will require the concentrated efforts of all Canadian enterprise to tackle the employment problem. Those believing that construction industry can perform miracles will probably be disappointed. If, however, the expectations set in the effects of a construction program are not set too high they are likely to be realized and the construction industry will make an important contribution to "full employment" as desired for the post-war period.

SECTION IX

SUMMARY

The role which the construction industry played in the Canadian economy in the past can be described in a number of ways. Some of the aspects indicating the importance of the industry can be dealt with quantitatively, others qualitatively. The necessity for such a study has become especially acute in recent months. There exists considerable misunderstanding as to the definition, scope and structure of the Canadian construction industry.

It has been pointed out in Section I that the importance of the Canadian construction industry for the Canadian economy can only be measured in a rough way because a number of statistics and estimates are missing at the moment. It has been sought in this study to supplement the missing statistics by estimates. It is clear, however, that a substitution of these estimates by undertaking the studies suggested would be highly desirable.

The importance which building and construction has for the Canadian economy can be summarized as follows.

It is essential first of all to agree on a definition of the construction industry. It has been suggested in Section II that a distinction be made between construction proper, which includes construction undertaken by general and trade contractors, the Dominion Government, the Harbours Board, the Provincial governments and the Municipalities, and the construction material supplying and transporting industries, also called the auxiliary industries. The aggregate of construction proper and the auxiliary industries make up construction in its extensive sense.

It is important to bear this definition in mind because there exists a great range of definitions of building and construction as described more in detail in Section II.

It is further important to remember that the statistics compiled by the Dominion Bureau of Statistics do not include all construction done in Canada. The Construction Census deals only with trade construction undertaken by general contractors and sub-contractors (new construction and maintenance) and construction undertaken directly by the public authorities. No consideration is given to construction work undertaken by firms which engage in work not connected with the construction industry but which carry out construction work with their own employees (for example, mines, logging industry), the railway companies, the telephone and telegraph companies, a number of working proprietors (e.g. a carpenter in a village) and persons doing part-time construction work on their own dwellings in rural or urban areas.

It has been estimated in Section IV that the Construction Census covered for the year 1940 only approximately 55 percent of all construction work done in Canada.

The employment created in construction proper and the construction material supplying and transporting industries has been described as primary. This is, however, not the total employment created by a given volume of construction expenditure. Additional employment is created in a number of other industries. The effects of a given volume of primary employment are called "secondary effects". These effects are analyzed qualitatively in Section VIII.

When comparing the net and gross value of construction with net and gross national income it is important to consider the different definitions and different methods used in computing the national income. It has been pointed out that the Dominion Bureau of Statistics, the Research Staff of the Royal Commission on Dominion-Provincial Relations and the Bank of Nova Scotia have made separate estimates of national income in Canada. A graphic representation of these national income estimates brings out clearly the different results obtained by the use of different methods in the computation of the national income.

It is possible to determine the ratio of net national income originating in construction to the national income for the period 1935-1939. A comparison with the Dominion Bureau of Statistics' estimate showed an average ratio for the five-year period of 3.3 percent while a comparison with the Royal Commission's estimate showed an average ratio of 3.6 percent. The net national income originating in construction refers to construction work undertaken by contractors and sub-contractors and the public authorities; it does not include the contribution of the construction material supplying and transporting industries.

A comparison of wages and salaries paid to persons employed in the construction industry and the construction material supplying and transporting industries with the total wages and salaries paid to all persons employed in Canada shows an average ratio of 10.6 percent for the period 1936-1940.

Some useful information may also be obtained by examining the gross revenue as computed by the Dominion Bureau of Statistics. A comparison of gross revenue in construction with total gross revenue shows for the period 1936-1940 an average of 1.84 percent. Gross revenue in construction refers to construction work done by general and trade contractors only. Total gross revenue refers to the gross national income in its most extensive form.

The above comparisons, however, do not pay attention to construction work not reported by the Construction Census. An estimate for 1940 (see Section IV) shows that about $398,000,000 of construction work was not reported by the Construction Census as against $474,000,000 reported in the Construction Census. A comparison of gross value of construction, reported and not reported with the gross national product as computed by the Research Staff of the Royal Commission on Dominion-Provincial Relations shows, for the period 1938-1940, that the ratio varied between 12.8 percent and 13.3 percent.

When referring to the construction industry as a field of employment distinction has to be made between the activity of the wage earners and the gainfully occupied. Wage earners are persons who work for a salary or wage irrespective of the nature of their employment. Gainfully occupied persons include wage earners, individual enterprisers (e.g. an independent carpenter) and unpaid labourers who receive their payment mainly in kind (e.g. a farmer's son).

An analysis of construction as a field of employment for the period 1936-1940 gives the following picture:

(1) Ratio of the number of wage earners in construction excluding construction work undertaken directly by the public authorities to all wage earners..... 3.2 percent

(2) Ratio of gainfully occupied in construction excluding construction work undertaken directly by the public authorities to all gainfully occupied..... 2.5 percent

(3) Ratio of the number of wage earners in construction proper (including construction work undertaken directly by the public authorities) and in the construction material supplying and transporting industries to all wage earners.....11.2 percent

(4) Ratio of gainfully occupied in construction proper (including construction work undertaken directly by the public authorities) and in the construction material supplying and transporting industries to all gainfully occupied..... 7.3 percent

It has been pointed out how important it is to be in a position to determine the size of employment in the construction material supplying and transporting industries, also called indirect employment. No systematic analysis of this type of employment has been done in Canada. Such calculations, however, have been made in the United States, Sweden, Russia and Germany and have proved of great usefulness to the countries concerned for the purpose of planning ahead the allocation of labour supplies.

A comparison of the physical volume of construction with the physical volume of iron and steel, of carloadings and of all business brings out the great fluctuations which construction industry underwent during the period 1929-1942. The short presentation of the consequences of a sudden decline in the volume of construction activity, which has been given in Section VI, makes clear the need for giving special consideration to the problem of how to assure a greater stability of the construction industry in the post-war period.

Some relevent comparisons of the Canadian construction industry with its equivalent in the United States have been made in Section VII. It is noted that the authorities in the United States experienced similar difficulties to the authorities in Canada in their endeavour to make the statistics on construction as complete as possible. This analysis shows that with the exception of 1930 and 1931 the national income in Canada decreased at a slower pace than in the United States. From 1934 onwards national income in Canada recovered at a faster pace than in the United States. The same phenomenon could be noted with regard to income originating in construction in Canada and in the United States. It follows that in relation to the 1929 level and as far as unadjusted dollar values indicate, Canada suffered less from the depression and reached, in its recovery, a higher point than the United States.

An analysis of the importance of the construction industry for the Canadian economy is not complete unless the secondary effects of construction expenditures are considered. The secondary effects produced by a given volume of primary employment in the construction field may be summarized as follows:

(1) Additional employment is created by the necessity to maintain new structures.

(2) Employment is created in certain appliance and durable consumer goods industries which provide the new structures with the appliances (e.g. refrigerator) and the durable consumer goods (e.g. carpets) required.

(3) Secondary employment is created in all consumer goods industries because of the increased funds at the disposal of those employed in construction (primary employment).

A number of Canadians have repeatedly emphasized the importance of these secondary effects of construction on the Canadian economy. A selected number of views held by a cross-section of Canadians is analyzed in Section VIII. Furthermore, the views held by a number of authorities and economists in Great Britain and in the United States is critically examined.

It is found that the range of the volume of secondary employment caused by a given volume of primary employment is great and depends on a number of factors. One of the most important factors is the timing factor. This factor has to be taken into consideration when plans for post-war construction projects and other projects contributing to the economic welfare of the country are being made. Only if such plans are made well ahead of time, will it be possible to put them into effect when it appears to the best advantage of the country.

There is no doubt that a properly organized and efficiently working construction industry can make an important contribution to the post-war economy. It is, however, important to remember that the construction industry is neither the sole source of prosperity of a country nor can increased expenditure for construction purposes alone solve the unemployment problem. The particular merits of the construction industry, in addition to the fact that it creates durable assets, have been described in Section VIII as follows:

(1) Although, compared with the total labour potential of Canada, construction expenditure provides direct and indirect employment for a relatively small group, it nevertheless affects a great number of trades and a wide range of gainfully occupied persons in practically every part of the country.

(2) Construction is one of the most visible economic activities for the public eye. If a considerable increase of construction activity takes place throughout the country, it brings clearly before the public the fact that we are travelling on a road towards a betterment of economic conditions. These visible effects of construction expenditure definitely assist in bringing back confidence in business which is so important for a well functioning economic organism.

In conclusion it may be said that if the expectations set in the effects of a construction program are not set too high, they are likely to be realized. Thus, the construction industry can make an important contribution to full employment as desired for the post-war period. Dr. W.C. Clark said when he spoke about housing: "I believe that if we succeed in finding a way by which the building industry is able to provide decent homes for the mass of our people, we shall also have found one of the most important avenues to renewed and continuing prosperity, not only for all those now in the house-building industry, but also for our whole economy." (1) This statement can very well be adapted to the construction industry as a whole by saying that if we find a way by which the potentialities of the construction industry are fully exploited, then we shall also have found one of the most important avenues to renewed and continuing prosperity in the post-war era.

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(1) W.C. Clark: "Housing", Dalhousie University Bulletins on Public Affairs, VI, Halifax, 1938, p. 28.

APPENDIX I

TABLE XXVI

COMPARISON OF NET PRODUCTION IN CONSTRUCTION WITH NET PRODUCTION OF ALL (MATERIAL) INDUSTRIES CONTAINED IN PROFESSOR J. A. COOTE'S REPORT ON "IMPACT OF WARTIME CONTROLS ON THE CONSTRUCTION INDUSTRY". (1)

1923 - 1938

Year	Net Production of Construction (2) Million Dollars	Net Production of All (Material) Industries (3) Million Dollars	Percent of Total
1923	212.1	3,051.4	6.95
1924	187.1	3,018.2	6.2
1925	202.1	3,325.1	6.1
1926	251.1	3,613.4	6.95
1927	317.9	3,896.3	8.15
1928	319.1	4,122.5	7.75
1929	386.7	3,946.6	9.75
1930	297.0	3,216.7	9.25
1931	205.0	2,500.2	8.2
1932	86.3	2,104.9	4.1
1933	63.2	2,062.3	3.06
1934	115.4	2,233.7	5.2
1935	120.8	2,369.0	5.1
1936	135.8	2,665.8	5.1
1937	176.0	2,992.3	5.9
1938	176.6	2,974.7	5.95
		Average 1923 - 1938	6.48

(1) Data taken from Canada Year Books for the relevant years.

(2) "Net Production" of construction refers only to the contribution of construction industry proper and excludes the contribution of the construction material supplying and transporting industries.

(3) "Net Production" of all material industries refers, according to the Dominion Bureau of Statistics' classification, to the following nine main branches of production: agriculture, forestry, fishing, trapping, mining, electricity, construction and repair, and manufacturing. This range of economic activity does not cover the whole of Canadian enterprise. The "Commodity Handling Division" including transportation, communications and trade, and the "Facilitating Division" including banking and finance, government activities, and service excluding custom and repair are not considered.

TABLE XXVII

COMPARISON OF WAGES AND SALARIES PAID IN "PRIVATE CONSTRUCTION" WITH TOTAL OF WAGES AND SALARIES CONTAINED IN PROFESSOR J. A. COOTE'S REPORT ON "IMPACT OF WARTIME CONTROLS ON THE CONSTRUCTION INDUSTRY".(1)

1926 - 1940

Year	Private Construction (2) Million Dollars	All Canada Million Dollars	Percent of Total
1926	144.5	2,375.1	6.0
1927	147.3	2,515.8	5.8
1928	174.4	2,728.7	6.4
1929	216.2	2,900.5	7.4
1930	176.8	2.642.2	6.6
1931	143.6	2,269.4	6.3
1932	76.7	1,850.6	4.1
1933	46.6	1,674.9	2.8
1934	47.8	1,813.8	2.6
1935	62.0	1,984.0	3.1
1936	73.7	2,131.9	3.46
1937	107.4	2,437.0	4.4
1938	106.8	2,440.3	4.37
1939	110.0	2,552.1	4.3
1940	146.7	3,058.2	4.75
		Average 1926 - 1940	4.82

(1) Data taken from "National Income", Report for Royal Commission on Dominion-Provincial Relations, Appendix 4, Ottawa, 1939, and "National Income 1937 - 1940", Ottawa, January 1941.

(2) "Private construction" does not include construction work undertaken directly by the Dominion Government, the Harbours Board, the Provincial governments, and the municipalities, but it includes construction work undertaken by private contractors for the above mentioned public authorities. The contributions of the construction material supplying and transporting industries are not considered.

APPENDIX II

THE COMPUTATION OF GROSS REVENUE OF BUILDING AND CONSTRUCTION BY THE DOMINION BUREAU OF STATISTICS. 1919 - 1940

CONTENTS

A. DESCRIPTION OF SOURCES AND METHODS USED BY THE DOMINION BUREAU OF STATISTICS.

The Dominion Bureau of Statistics used the following sources and methods for the purpose of computing gross revenue of building and construction in Canada during 1919-1940.

An annual census of construction was conducted by the Dominion Bureau of Statistics from 1919 to 1921. While it is doubtful whether the co-operating firms constituted a large section of the industry, valuable relationships were established. The census was revived on an annual basis in 1934 and basic material is more adequate for subsequent years. "MacLean's Building Reports" furnish a continuous record of the value of contracts awarded to contractors with breakdown by classes and provinces. Prior to 1934, the decennial census is the best source of periodical information regarding the number of the gainfully occupied and the remuneration of employees.

1. Explanation of Tables XXVIII and XXX.

(a) The gross revenue from 1919-1933 was obtained from construction contracts awarded as published by Hugh C. MacLean Publications Limited in MacLean's Building Reports. The data were smoothed by taking three years moving average with adjustment in the first three years, 1919-1921 on the basis of the annual census undertaken by the Bureau. The reports on the construction industry prepared by the Construction Branch of the Bureau were the source of the statistics of gross revenue for the period from 1934 to 1940. The value of work performed by general and trade contractors and sub-contractors was used in this connection. The construction and repairs undertaken by the Dominion and Provincial governments, Harbours Board and Municipalities were not considered in compiling Table XXVIII, as such operations received treatment elsewhere in the National Income Study of the Dominion Bureau of Statistics as a part of governmental operations. Construction undertaken by the public authorities was considered in Table XXX.

(b) The cost of materials was derived from the annual census from 1934 to the present. The weights established in connection with the study of the cost of construction were applied to the gross revenue to determine the cost of materials from 1919 to 1933. The method of arriving at the proportion of the revenues paid for raw materials was as follows:

As up to 1941 no monthly wage data were collected, the annual index on wage rates in the building trades as prepared by the Labour Department was used in this connection. An enquiry was made by the Bureau in 1924 to find the relative cost of materials and wages in the construction industry. The proportion of 65 to 35 was obtained as a result of the enquiry. The relations vary in other years according to the fluctuation in prices of materials and wage rates. The index of building materials in 1924 (106.6) was divided into the proportion of the cost of materials for the year (65), resulting in a quotient (61.0). The index number of building materials on the altered base was multiplied by 61.0, giving the proportion for the cost of building materials.

After transferring to the 1926 base a similar process was carried through for the index of wage rates. The percentages established in this

way were raised somewhat for the period from 1925 to 1930, the adjustment having been made so as to facilitate the balancing of the account of the industry. The average percentage of gross revenue established through the annual census from 1934 to 1936, inclusive, was applied to the years 1931 to 1933.(1)

(c) The "value added" was obtained by subtracting the cost of materials from the gross revenue.

(d) The computation of the general expenses was accomplished by establishing a percentage rate of the value-added series. The results of the annual census from 1919 to 1921 were used as a guide in obtaining a percentage for the early years. The trend in the manufacturing group as well as the preliminary savings of the construction group were used in determining the rate in subsequent years. The gross national product is the difference between the value added and the general expenses.

(e) The fixed capital was computed as a percentage of the gross revenue. The percentage of fixed capital to the revenue was derived from the relationship established in the period from 1935 to 1938. The value of buildings, land, equipment, machinery, tools and vehicles owned by general and trade contractors and sub-contractors were summated for the purposes. A compilation from the balance sheets of public interest companies were examined for the extension of fixed capital for 1939 and 1940. The depreciation rate of 7.7 percent was determined by an examination of company reports tabulated in Statistics of Income of the Department of Internal Revenue, Washington.

(f) The income originating was the difference between the gross national product and the depreciation reserve. The same result would be obtained by adding income payments received by individuals and the positive or negative savings.

2. Explanation of Tables XXIX and XXXI.

Table XXIX refers to construction undertaken by private contractors only, while Table XXXI includes construction work directly undertaken by the public authorities.

(a) The salaries and wages are products of the numbers by rates. It was found by analysis of the results for the Census that in 1930-31 the numbers working on a full-time basis were 134,596 and the rate $828. The corresponding data for the calendar year 1930 were estimated at 144,864 and $843, respectively. The indexes of the volume of construction as reported in the Monthly Review of Business Statistics(2) and indexes of employment were averaged, the result being used as an interpolating factor. The fluctuation from 1931 to 1933 were determined by the index of volume only. As the number of employees given by the Census of 1921 appeared too high in comparison with other pertinent factors, the number was arbitrarily placed at 95,106 in 1920 and the series adjusted from 1919 to 1925 accordingly. The rates were interpolated according to the index of wage rates in the building trades as published in the Labour Gazette.

The trend of employment reported by the annual census was used in determining the number of employees for years subsequent to 1934. It was assumed that the numbers and remuneration reported for the industry included the working proprietors as well as the employees. The numbers of the employees was computed from 1934 to the present as a percentage of the gainfully occupied as indicated by the 1940 National Registration relationship. The rates were determined by the

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(1) This method of computation of gross revenue for 1931-1933 applies only to the revised estimate. Gross revenue for 1931-1933 was computed in the preliminary estimate in the same way as for the years 1923-1930.

(2) Dominion Bureau of Statistics: "Monthly Review of Business Statistics", p.8.

wage rate data of the Labour Gazette, the amount of the salaries and wages being obtained by multiplication. The numbers and withdrawals of working proprietors for the period were taken as residuals.

(b) Withdrawals of working proprietors for the period of 1919 to 1933 were the products of computed numbers and rates. The numbers were reported as 40,379 and 33,617 in 1921 and 1931, respectively. The average of the indexes of volume and employment was used as an interpolating factor. The rates were set at $1,835 in 1920 and $994 in 1930 and the index of wage rates published by the Department of Labour was used for interpolation.

(c) Other Labour Income consists of payments by the Workmen's Compensation Boards for injuries sustained while at work.

(d) Net dividends and interest were compiled from Corporate Securities as published by MacLeans Publishing Company, Limited.

(e) Payments to individuals comprise salaries and wages, other labour income, net dividends and interest and withdrawals.

(f) Positive or Negative savings were obtained by subtracting income payments from income originating.

TABLE XXVIII.

OPERATING ACCOUNTS OF THE CONSTRUCTION INDUSTRY, 1919-1940 - REVISED SHEET NO. 1.

CONSTRUCTION WORK DONE BY GENERAL AND TRADE CONTRACTORS AND SUBCONTRACTORS

In thousand dollars

ITEM	1919	1920	1921	1922	1923	1924	1925	1926	1927	1928	1929
Gross Revenue	238,200	355,100	277,800	295,400	307,500	296,200	315,700	363,300	421,300	489,200	501,900
Cost of Material, Fuel and Electricity	71,317	105,891	88,785	99,195	116,850	120,850	129,437	148,953	189,585	229,924	235,893
Value added	166,883	249,209	189,015	196,205	190,650	175,350	186,263	214,347	231,715	259,276	266,007
General Expenses	16,238	24,273	23,873	24,271	24,022	22,445	24,307	28,400	30,586	34,224	35,113
Gross National Product	150,645	224,936	165,142	171,934	166,628	152,905	161,956	185,947	201,129	225,052	230,894
Fixed Capital	77,725	115,887	96,660	96,404	100,352	96,665	103,209	118,563	137,491	159,650	163,795
Depreciation	5,935	8,923	7,443	7,423	7,727	7,443	7,933	9,129	10,537	12,293	12,612
National Income	144,660	216,013	157,699	164,511	158,901	145,462	154,023	176,818	190,542	212,759	218,282

ITEM	1930	1931	1932	1933	1934	1935	1936	1937	1938	1939	1940
Gross Revenue	449,700	301,800	132,872	97,220	99,382	147,530	196,757	278,209	281,485	286,712	379,655
Cost of Material, Fuel and Electricity	206,862	158,445	69,758	51,077	51,777	76,345	104,810	151,805	152,976	160,521	227,378
Value added	242,838	143,355	63,114	46,213	47,605	71,187	91,927	126,404	128,509	126,191	152,277
General Expenses	31,569	21,796	10,266	7,896	6,549	8,991	10,002	12,160	11,630	10,903	12,182
Gross National Product	211,269	121,559	52,848	38,317	41,226	62,196	81,925	114,244	116,879	115,288	140,095
Fixed Capital	146,730	98,492	59,363	53,753	49,975	67,214	73,847	74,310	79,569	87,151	78,595
Depreciation	11,301	7,534	4,571	2,923	3,848	5,175	5,686	5,732	6,127	6,711	6,052
National Income	199,968	113,975	48,277	35,534	37,378	57,021	76,239	108,532	110,752	108,577	134,043

TABLE XXIX.

OPERATING ACCOUNTS OF THE CONSTRUCTION INDUSTRY, 1919-1940 - REVISED SHEET NO. 2.

CONSTRUCTION WORK DONE BY GENERAL AND TRADE CONTRACTORS AND SUBCONTRACTORS

In thousand dollars

ITEM	1919	1920	1921	1922	1923	1924	1925	1926	1927	1928	1929
National Income	144,660	216,013	157,699	164,511	158,901	145,462	154,023	176,818	190,542	212,759	218,282
Salaries and Wages	74,098	115,459	96,362	104,631	99,580	92,581	91,884	116,308	126,526	132,553	138,719
Other Labour Income	521	1,057	1,035	1,110	1,171	1,249	1,333	1,290	1,558	1,785	2,403
Net Dividends	191	231	222	315	91	91	91	89	89	283	1,050
Net Interest	133	153	137	134	126	115	110	89	120	161	233
Withdrawals	47,134	79,562	62,345	66,250	59,672	52,318	48,719	51,445	53,283	52,776	51,858
Payments to Individuals	122,072	196,162	160,101	172,440	160,640	146,354	142,137	169,221	181,576	187,558	194,263
Positive or Negative Savings	+ 22,583	+ 19,551	- 2,402	- 7,929	- 1,739	- 892	+ 11,886	+ 7,597	+ 8,966	+ 25,201	+ 24,019

ITEM	1930	1931	1932	1933	1934	1935	1936	1937	1938	1939	1940
National Income	199,968	113,975	48,277	35,334	37,378	57,021	76,239	108,522	110,752	108,577	134,043
Salaries and Wages	102,190	82,713	50,656	30,777	29,792	44,646	57,034	81,344	80,900	78,639	99,355
Other Labour Income	2,466	2,650	2,110	1,450	1,544	1,939	1,951	1,960	1,969	2,296	1,824
Net Dividends	1,272	1,139	666	150	96	286	284	300	306	317	178
Net Interest	213	200	207	208	204	220	217	217	201	180	166
Withdrawals	42,452	32,205	22,480	13,831	9,564	14,371	18,308	26,112	25,969	25,244	31,893
Payments to Individuals	168,523	118,915	61,086	36,416	41,200	61,422	77,794	109,933	109,345	106,676	133,416
Positive or Negative Savings	+ 31,455	+ 4,940	- 12,809	- 1,082	- 3,822	- 4,401	- 1,555	- 1,411	+ 1,407	+ 1,901	+ 627

TABLE XXX.

OPERATING ACCOUNTS OF THE CONSTRUCTION INDUSTRY, 1919-1939 - PRELIMINARY SHEET NO. 1.

CONSTRUCTION WORK DONE BY CONTRACTORS AND THE PUBLIC AUTHORITIES

In thousand dollars

ITEM	1919	1920	1921	1922	1923	1924	1925	1926	1927	1928	1929
Gross Revenue	327,200	444,100	366,800	384,400	396,500	385,200	404,700	452,300	510,300	578,200	590,900
Cost of Material, Fuel and Electricity	114,200	154,500	142,700	148,100	152,400	153,900	165,400	188,900	218,400	255,300	267,400
Value added	213,000	289,600	224,100	236,300	244,100	231,300	239,300	263,400	291.900	322,900	323,500
General Expenses	23,200	23,500	35,800	31,200	31,200	33,000	37,800	40,300	43,200	49,400	51,100
Gross National Product	189,800	266,100	188,300	205,100	212,900	198,300	201,500	223,100	248,700	273,500	272,400
Fixed Capital	50,000	61,000	62,000	68,200	67,800	68,100	71,000	76,000	79,000	82,000	86,000
Depreciation	3,900	4,700	4,800	5,300	5,200	5,200	5,500	5,900	6,100	6,300	6,600
National Income	185,900	261,400	183,500	199,800	207,700	193,100	196,000	217,200	242,600	267,200	265,800

ITEM	1930	1931	1932	1933	1934	1935	1936	1937	1938	1939	1940
Gross Revenue	538,700	390,800	270,900	207,700	176,800	215,500	258,000	351,900	353,200	373,200	474,122
Cost of Material, Fuel and Electricity	258,800	193,600	131,900	94,500	68,700	94,700	122,200	175,800	176,600	189,500	
Value added	279,900	197,200	139,000	113,200	108,100	120,800	135,800	176,100	176,600	183,700	
General Expenses	47,000	27,608	19,182	15,395	14,594	15,221	16,296	20,428	19,426	20,207	
Gross National Product	232,900	169,592	119,818	97,805	93,506	105,579	119,504	155,672	157,174	163,493	
Fixed Capital	85,800	83,400	82,000	78,000	65,000	52,000	58,500	52,000	52,000	53,000	
Depreciation	6,600	6,400	6,300	6,000	5,000	4,000	4,500	4,000	4,000	4,076	
National Income	226,300	163,192	113,518	91,805	88,506	101,579	115,004	151,672	153,174	159,417	

TABLE XXXI.

OPERATING ACCOUNTS OF THE CONSTRUCTION INDUSTRY, 1919-1939 - PRELIMINARY SHEET NO. 2

CONSTRUCTION WORK DONE BY CONTRACTORS AND THE PUBLIC AUTHORITIES

In thousand dollars

ITEM	1919	1920	1921	1922	1923	1924	1925	1926	1927	1928	1929
National Income	185,900	261,400	183,500	199,800	207,700	193,100	196,000	217,200	242,600	267,200	265,800
Salaries and Wages	92,404	159,420	127,242	121,513	121,371	115,800	114,164	123,252	131,325	138,836	152,535
Other Labour Income	628	1,057	1,075	1,106	1,171	1,249	1,333	1,319	1,592	1,811	2,374
Net Dividends	231	231	231	314	91	91	91	91	91	287	1,037
Net Interest	60	57	53	50	47	43	41	34	46	61	86
Withdrawals	58,366	81,890	69,573	70,940	68,948	68,569	69,004	72,060	79,911	83,830	80,983
Payments to Individuals	151,689	242,655	198,174	193,923	191,628	185,752	184,633	196,756	212,965	223,825	237,015
Positive or Negative Savings	+ 34,211	+ 18,745	- 14,674	+ 5,877	+ 16,072	+ 7,348	+ 11,367	+ 20,444	+ 29,635	+ 42,375	+ 28,785

ITEM	1930	1931	1932	1933	1934	1935	1936	1937	1938	1939	1940
National Income	226,300	163,192	113,518	91,805	88,506	101,579	115,004	151,672	153,174	159,417	
Salaries and Wages	149,105	120,142	92,242	80,056	77,699	82,607	87,576	120,239	112,595	118,601	
Other Labour Income	2,422	2,623	2,077	1,426	1,544	1,939	1,951	1,960	1,969	2,296	
Net Dividends	1,249	1,127	656	147	96	286	284	300	306	310	
Net Interest	78	77	76	76	76	82	81	81	81	81	
Withdrawals	67,856	50,089	32,071	24,137	16,922	22,580	25,271	30,398	34,810	34,841	
Payments to Individuals	220,710	174,058	127,122	105,842	96,337	107,494	115,163	152,978	149,761	156,129	
Positive or Negative Savings	+ 5,590	+ 10,866	- 13,604	- 14,037	- 7,831	- 5,915	- 159	- 1,306	+ 3,413	+ 3,288	

APPENDIX III

List of Selected Sources Which Contain Original Information on the Construction Industry.

1. Dominion Bureau of Statistics: Report on the Construction Industry, 1919 - 1920, 1934 - 1941.
2. Dominion Bureau of Statistics: Canada Year Books.
3. Dominion Bureau of Statistics: Population Census 1921 and 1931.
4. Dominion Bureau of Statistics: Annual Reviews of the Employment Situation in Canada.
5. Dominion Bureau of Statistics, Department of National War Services: National Registration 1940.
6. Dominion Bureau of Statistics: A number of monographs such as housing, unemployment, etc.
7. Dominion Bureau of Statistics: National Income Study.
8. Research Staff of the Royal Commission on Dominion-Provincial Relations: National Income Study.
9. Department of Labour: "Wages and Hours of Labour in Canada".
10. Department of Labour: Annual Reports on Labour Organizations in Canada.
11. Department of Labour: Reports on the "Organizations in Industry, Commerce and the Provisions in Canada".
12. MacLean's Publishing Company: "MacLean's Building Reports".
13. A number of periodicals and trade journals such as "Daily Commercial News and Building Records", "Engineering and Contract Record", Building In Canada", etc.
14. A number of pamphlets and articles published by associations and individuals interested in the construction industry.

APPENDIX IV

"Chart Showing Labour Produced by Dominion Public Building - Winnipeg, Manitoba."

1934 - 1935

Calculations undertaken by Carter-Halls-Aldinger Company Limited - General Contractors in Winnipeg.

SUMMARY

Wages and salaries to persons employed on the construction project	$ 423,300
Expenditure for construction material and transportation services	711,000
Overhead expenses and profits	272,700
Total	$1,407,000

On-site employment created - man-hours	705,820
Off-site employment created	1,375,360
Total	2,081,180

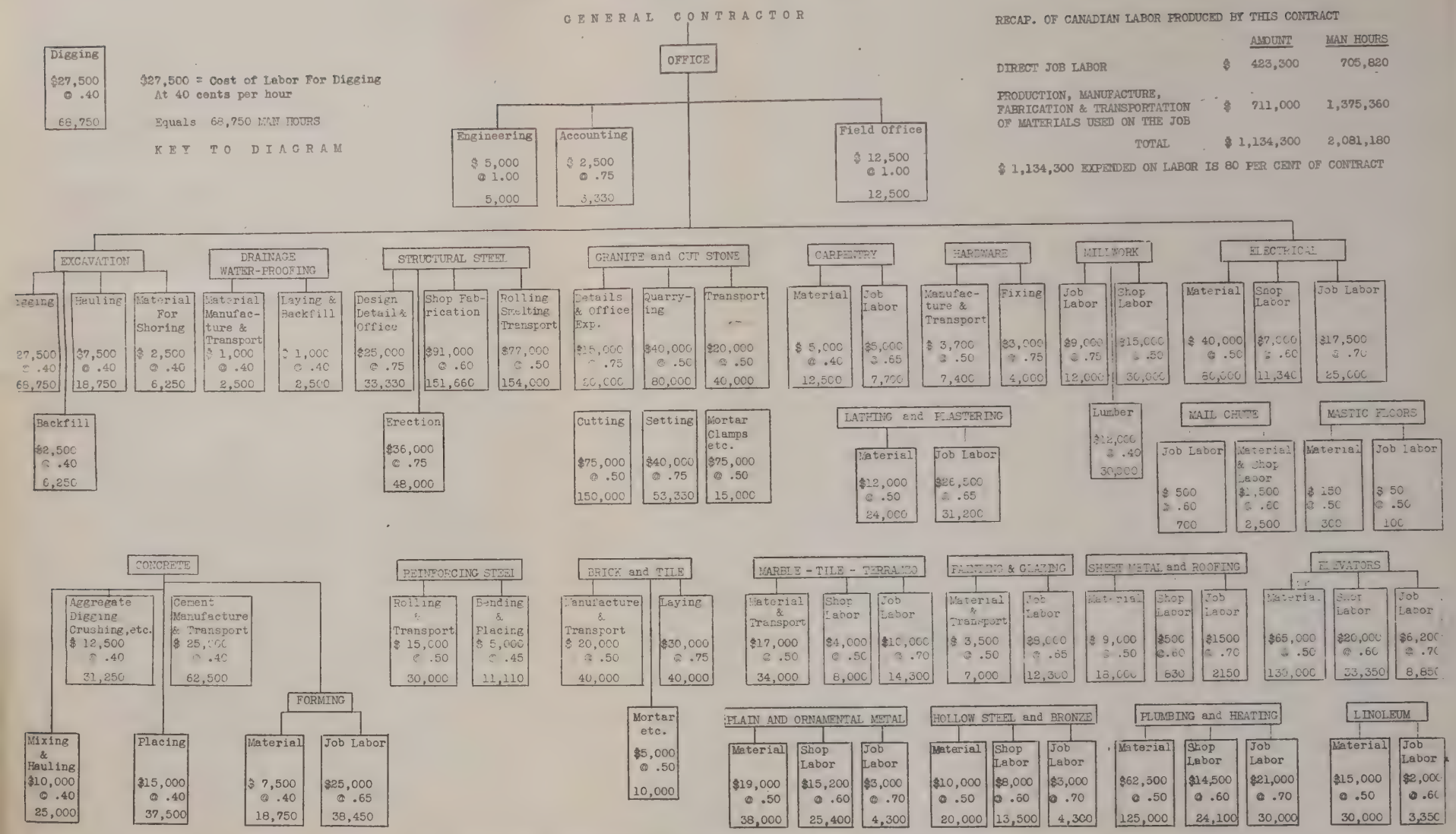
FIGURE XX

CHART SHOWING LABOR PRODUCED BY

D Ó M I N I O N P U B L I C B U I L D I N G

WINNIPEG, MANITOBA

UNDERTAKEN BY CARTER-HALLS-ALDINGER COMPANY, WINNIPEG
IN 1934-1935



Digging
$27,500
@ .40
68,750

$27,500 = Cost of Labor For Digging
At 40 cents per hour

Equals 68,750 MAN HOURS

KEY TO DIAGRAM

RECAP. OF CANADIAN LABOR PRODUCED BY THIS CONTRACT

		AMOUNT	MAN HOURS
DIRECT JOB LABOR	$	423,300	705,820
PRODUCTION, MANUFACTURE, FABRICATION & TRANSPORTATION OF MATERIALS USED ON THE JOB	$	711,000	1,375,360
TOTAL	$	1,134,300	2,081,180

$ 1,134,300 EXPENDED ON LABOR IS 80 PER CENT OF CONTRACT

2,081,180 MAN HOURS IS EQUIVALENT TO 1,300 MEN WORKING ONE YEAR OF 200 WORKING DAYS

APPENDIX V.

BIBLIOGRAPHY OF PUBLICATIONS AND MEMORANDA

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